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VIEWS, NEWS AND INTERVIEWS.

"That such an apparently trifling matter as the manner in which the paper strip is wound around the conductors of the now much used dry-air cables should make much difference to the splicer seems hard to believe, except to one thoroughly familiar with the details of drawing in and splicing underground cables," remarked a prominent cable manufacturer the other day. "Yet such is a fact. You see, in some cables the paper strip is wound in one direction, say a right or left-handed spiral, and when the cable is ready to be spliced and the wire ends have to be skinned back, the paper has a tendency to unwind in a very untidy manner, back to where the lead sheath commences. In other cables two strips of paper are used, wound in opposite directions, and the observing workman, in splicing that kind of a cable, pats himself on the back and saves half the time in not having to rewind the raveled ends."

News comes from the West that farmers in Moultrie County, Ill., are using their barbed wire fences for telephone lines. One farmer, it is reported, uses a line of this sort 25 miles long.

A story is going the rounds concerning the advance agent of a well known circus and the telephone. It seems that the advance agent was in a city in the West, and found it necessary to quickly transact some business in New York. He went to a telephone pay station, and after finishing his talk, was told the charge was $40. He had expected to pay but $1.75. The excess charged was due to the fact that the gentleman stammered remarkably well, with the result that it cost him about 50 cents a word to say what any other man would have said for about one cent a word.

Dr. A. P. Southwick, who is credited with being the "father of electrocution," died recently at his home in Buffalo, N. Y. It is said that in 1881 he evolved the electrocution idea from reading about a man being instantly killed by coming in contact with a live wire. He experimented upon the lower animals, and finally succeeded in getting a commission appointed by the Governor of New York State. The commission was composed of Dr. Southwick, Commodore Elbridge T. Gerry and Matthew Hale. The committee reported in favor of electrocution, and after a long and acrimonious struggle, which will be recollected by most electrical men, the recommendation of the committee became a law.

A man out in Orange, N. J., is a lively opponent of overhead wires of all kinds. A few weeks ago a big tree on his place appeared to be dead. He concluded it had been killed by an electric light wire which had been blown down a short time before. He hired a sign painter to prepare the following sign and attached it to the tree: "This tree was killed by an electric light wire." Last week, however, the sign was removed, for the tree began to leaf.

The Russian War Department is said to be conducting a series of experiments with searchlights mounted in captive balloons. The current is supplied through the cable holding the balloon to the ground. The largest searchlight used so far is of 5,000 candle-power, which, it is stated, will thoroughly illuminate a circular area 500 yards in diameter when at an altitude of 600 yards.

A Prepayment Meter.

The popularity of a prepayment system in connection with artificial illumination is undoubted. It has strengthened the unsecure tenure of the gas companies by creating a handsome revenue from a section of the public which is commonly reputed to be beyond the civilizing influences of quarterly accounts. Light is a necessity even to the submerged tenth, and the essential principles of prepayment were quickly grasped by it. It was discovered that a pennyworth of gas went further than oil, and was immeasurably more convenient. The fact that it was infinitely safer than the devastating oil lamp may not have counted for much, but no doubt the prepayment gas meter has operated very effectually in this direction. The prepayment system, however, has extended beyond the poorer classes of the community, and is not uncommon in the flats and domiciles of the well-to-do. With the success achieved by the gas companies so prominently displayed, it was not surprising that attempts should be made to apply the principle to electric lighting, and Mr. C. O. Bastian, whose electrolytic meter has

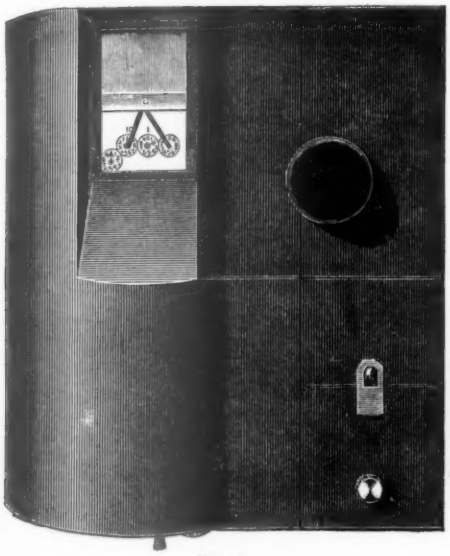


FIG 1.

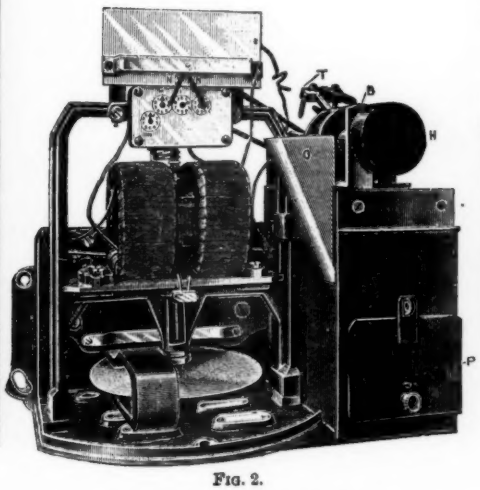


FIG. 2.

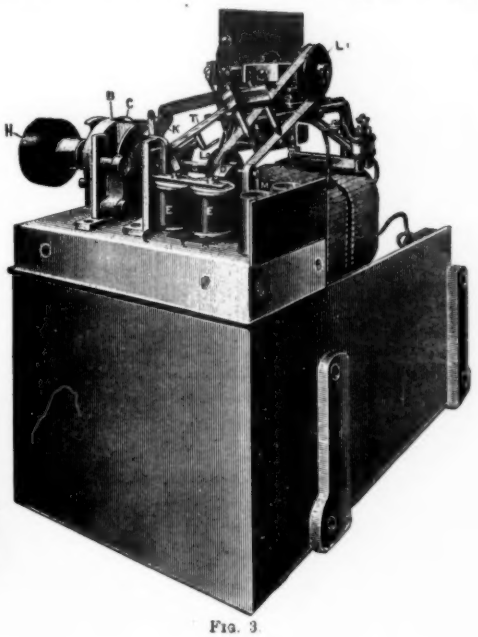


FIG. 3.

A PREPAYMENT ELECTRIC METER.

been discussed a good deal of late, has been working on the subject for some two or three years. The prepayment electric meter devised by Mr. Bastian has gone through quite an evolutionary process before arriving at its present form, the chief modifications tending towards a simplification of the instrument.

This prepayment arrangement does not imply a special form of meter, for the device can be attached to any of the well known types of meter. The illustrations by which we shall strive to explain the working of the instrument show the prepayment mechanism applied to a Thomson wattmeter. The operation of the instrument, by means of a coin, is an interesting and ingenious one. Until a coin is inserted the handle, which projects from the cover, is free to move; a coin, when pressed through the slot, falls into a groove, and forms a rigid connection between the handle and the interior mechanism, and a turn of the handle switches on the current. The arrangement of the meter will be better appreciated by referring to the detailed parts. Fig. 1 shows the meter and prepayment attachment entirely enclosed, which is the form in which the mechanism will be usually sold. Fig. 2 is front view of the meter, the only features to be noticed here being the coin receiver or shoot down shown at O, and the pointers N N, the exact function of which will be referred to subsequently. Fig. 3 gives a detailed view of the prepayment mechanism seen from the back of the meter. We will now follow the action of the apparatus. Upon the insertion of the coin at B, which makes a mechanical connection, the handle H is turned. One result of this is to operate on the pivoted end of the switch T, which is depressed into the mercury cups M, thus completing the circuit through the meter. The switch is held in the mercury cups, against the tension of a spring, by means of a clutch D. The turning of the handle does more than merely put the switch on. In fact, the operation that we are about to describe is probably the most important in the complete action of the mechanism. Above the dials of the meter (Fig. 2) will be observed two pointers, and the relation of these to one another is very important. The handle H, being in connection with a rod G, its movement will cause a partial revolution of the pulleys L and L. These pulleys are connected together by means of a miniature rawhide belt; pulley L is mounted on an axle, which carries one of the pointers already alluded to. It will be seen, therefore, that when the handle is turned, one of the needles, through the medium of the pulleys, is moved away from the other pointer, the exact distance of its movement being predetermined. The second pointer is geared to the train wheels of the meter, and when the switch has been put on by the agency of a coin, the meter commences to run, and the second pointer travels slowly after the first one. The exact distance it has to traverse before it overtakes the first pointer is a measure of the current consumed; in fact, the first pointer is caught up by the second pointer in a time inversely proportionate to the amount of current flowing through the meter. The distance that the first is separated from the second is determined by the gear wheels, which are proportioned according to the price per unit and the value of the coin with which the mechanism is intended to be operated.

The more coins that are dropped in, up to a certain limit, the further the first pointer will be separated from the second, and they will be a proportionately longer time in coming together. One side of the first pointer is insulated so that it can come in contact with one side of the second pointer with impunity. The other side, however, carries a platinum contact, and when the second overtakes it and comes in actual contact, a current of electricity at once flows round the electro-magnet E, whose armature is immediately raised, and pulls the clutch D away from the switch F, which immediately flies into the off position.

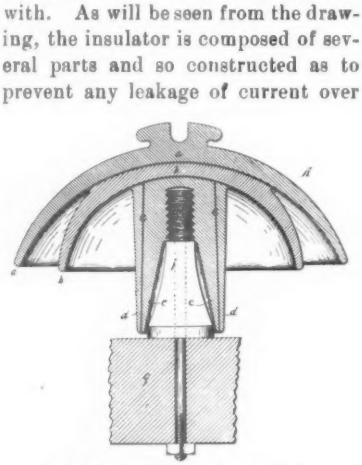
From observations we have made, says our London namesake, from which the above is quoted, the action of the meter seems to be certain, and the instrument ought to meet with considerable success.

LITERARY.

Recent doings of the navy on the southern coast of Cuba occupy much space in the new number of *Collier's Weekly*. Gallant Hobson's portrait is on the first page, encircled by "Jackies'" caps tossed aloft, this being the navy's favorite method of expressing admiration; there is a full-page picture of the "Merrimac" sinking in the inlet of Santiago Bay, and a double-page picture of the three-hour bombardment of the Santiago forts and fleet on the 6th instant. Still another illustration of the glorious Hobson incident is a full-page picture of the response of the crew of a battleship to the call for volunteers to take the "Merrimac" into the jaws of death.

A New Porcelain Insulator.

Fred M. Locke, of Victor, N. Y., the well known inventor and manufacturer of porcelain insulators for high-tension lines, has just been granted a patent on the new type of insulator which is illustrated herewith. As will be seen from the drawing, the insulator is composed of several parts and so constructed as to prevent any leakage of current over



A NEW PORCELAIN INSULATOR.

the insulator to the support, and thereby obviate the burning off of the pin. The inner petticoat extends down to a point adjacent to the cross-arms, upon which the pin is mounted, to serve as a protecting sleeve for the pin and to increase the arcing distance of the current around the insulator.

The insulator is composed of several shells which are coated with a layer of slip or glaze, then nested together and baked in a kiln, so as to form practically a single piece. The central petticoat is composed of two parts joined in this way. The seam of glaze between the shells, it is claimed, will resist the escape of the current.

Pardoned By Telephone.

A convict in the state prison at Trenton, N. J., was pardoned by telephone last week. The Court of Pardons met at Trenton, but Governor Voorhees was at the military camp at Sea Girt, N. J. The transactions of the court were carried on by telephone, and the attorney-general of the state rendered the opinion that Governor Voorhees's consent to the pardon by telephone would be valid.

Mr. H. J. Medbery, of the Warren-Medbery Company, Sandy Hill, N. Y., visited New York city last week.

ELECTRICAL STATUS OF THE PHILIPPINES.

SOME INTERESTING FACTS ABOUT THE ISLANDS ADMIRAL DEWEY CONQUERED.

The Philippine Islands are just now an interesting subject to all Americans, and a great deal of interesting matter regarding them is being published. The number of islands is estimated at from 1,200 to 1,400, the area of which is, according to the latest figures, 114,356 square miles. The largest island, Luzon, has an area of 40,024 square miles. Manila is the largest city and the capital of the Philippines. It has a population of about 200,000, the total population of the islands being 7,670,000. There is a small Spanish resident population and about 100,000 Chinese, who largely control the principal industries. The native inhabitants are of the Malayan race to a great extent.

The well known electrical firm of Bagnall & Hilles, of Yokohama, Japan, and Singapore, Straits Settlements, also maintains a branch house in Manila. Mr. L. D. Hilles, of this firm, is now in New York city, and in a conversation with a representative of the ELECTRICAL REVIEW, gave a number of interesting facts about the Philippines.

"Those islands should by all means remain in the possession of the United States," said Mr. Hilles. "Their commercial possibilities and native resources are almost unbounded. The sharpest competitors of the Americans and the Englishmen doing business there are the Germans.

"Our firm has installed a central electric lighting station in Manila, which supplies current for 12,000 incandescent and 260 arc lights. The machinery is of American manufacture. I am now making large purchases of American steam and electrical apparatus to be installed in the far East, a part of which goes to Manila.

"There are about 720 miles of telegraph in the islands and only 70 miles of steam railway. Manila has a telephone system equipped with English instruments. All electrical conductors are carried on overhead pole lines with porcelain insulators. There is also a horse railway in Manila which would have been changed over to a trolley road had not the war occurred. The concession for this road has already been acquired. There is a wonderful chance for Americans in many industrial undertakings in the Philippines, and I hope our government will hang on to them."

INSULATION AND CONDUCTION.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK, MARCH 23, 1898, BY REGINALD A. FESSENDEN.

(Concluded from page 381.)

In cases where cloth is to be treated we have a very different question. There are two ways of using cloth—first, as a backing merely, by coating it on the surface with some substance which is supported by it, as plaster on lathing. Many substances work well in this situation, but the fact that little tubes of cellulose are very apt to stick up through the coating—as was pointed out to me by Mr. F. R. Upton many years ago—and that if moisture gets in at the edge it spreads all over, renders it not the best kind of insulation. Rubber is sometimes applied in this way to cotton tape, but, though of very high resistance and insulation at first, it rapidly deteriorates. In general, it should be said that, where a permanent result is desired, rubber should never be used unless kept in the dark and out of contact with air. If these precautions be neglected the life is very short. The other method is to saturate the whole cloth with some substance which will penetrate every crevice; but, when this impregnating substance has solidified, it must continue to fill these crevices and capillary tubes. For this reason no substance which is dissolved in anything else can be used. If, for instance, we try a varnish dissolved in alcohol, it will be found that the strength of the solution in the capillary tubes is much smaller than outside, for the same reason that sea water filtered through sand becomes fresh.* Consequently, on drying these capillary spaces are not filled up and let water in. Therefore, unless we adopt the first method and plaster the insulator on thickly and deep enough so that it does not matter whether the support insulates or not, we must use melted solids or drying oils. Unfortunately but few solids which melt are elastic, since this elasticity is obtained by a structure which is destroyed by melting, and those solids which melt into thin liquids and remain flexible when solid, do not preserve this property except within narrow limits of temperature, as can be easily tested by holding under a cold water tap and striking the specimen sharply. Soft paraffine can be used in some cases if the cellulose be well dried and thoroughly saturated. The asphalts can not as a rule be used, as they never get sufficiently fluid on melting. There is, however, one notable exception—uintaite, or, as it is commercially called, gilsonite. This substance I found many years ago had the peculiar property that, when melted, like paraffine or oil, it will pass into the pores of cellulose or cloth. Having a very high melting point, nearly 300 degrees, if I remember, and mixing perfectly with paraffine in all proportions, it gives mixtures which are admirably adapted for induction coil work, as these compounds can be made to have high melting points and to penetrate a coil thoroughly. I also some years later, in 1891, used this material in combination with linseed oil for transformers, the process at first proposed being boiling in vacuum, but it was found that even without this saturation was complete. I understand that this method is still used, though modified in form, by the company for which I first devised it. Of the drying oils, with the exception of some foreign oils, as Chinese wood oil and an African oil whose name I can not recollect or ascertain, linseed and the drying nut oils are the best. Linseed oil has the remarkable property of expanding on drying. This enables it to fill up all pores. Its durability is evinced by the good condition of old oil paintings. The varnishes crack and go, but the oil remains. Its insulation is not injured up to very high temperatures, at which shellac, rubber, etc., would be worthless. This material was used a great deal by the Edison company in its early days, but it often broke down. The trouble was traced to the lead drier, and after many experiments Mr. Marshall, who had charge of this work, finally settled upon the use of pure raw oil. This gave excellent results and was long used, but took some time to dry, and the writer finally, after many tests, found that borate of manganese drier got rid of the trouble, while, as is well known, it gives a very quick drying varnish. This was used by the United States company in Newark on their machines, with the result that in 1890, after use for a year, the foreman reported only two armatures so treated as returned for repair (they were injured by lightning), and no fields. This material was also used by the Stanley company for transformers. Another advantage of this borated oil is that it always retains a slight stickiness, and so gives a good joint when wrapping around wires, etc. Many substances so used are not sticky and let moisture in through the joints. Where a smooth surface is required, it is readily obtained by dusting on a little tale, a method first suggested, I believe, by Mr. Edison. It can also be given a coat of japan on the outside. Varnish gums should never be used with linseed oil, as they are brittle, and the dried oil is only just flexible enough. Consequently, when the oil has dried, the resultant varnish is always very brittle. A temporary elasticity is given at first by the fact that when the solvent has dried off the oil is still fluid and undried, and as the varnish gum keeps the air from getting at it rapidly, it sometimes remains flexible for a year. Such mixtures also crack when cold.

Sample C is a specimen of borated oil saturated cloth, which is now between eight and nine years old. It will be noted that it is still fresh and flexible, and a recent dielectric strength test showed up very high, 7,000 volts, if I recollect. The pure raw oil is boiled at about 200 degrees, with one-half per cent of borate of manganese, for several hours, till it begins to be thick.

Non-inflammable materials can be made, as I have pointed out elsewhere, by taking out the hydrogen atoms of hydro-carbons and substituting chlorine. Even paraffine can be thus treated if kept warm, and first turns to a fluid and then to a solid. At one time it seemed as if this process might be valuable, but the use of enclosed conduits has done away with the greatest source of danger from fire.

I will conclude by describing a couple of devices which I have found useful in preventing insulation from being spoiled. Soldering acid, as commonly used, is a solution of chloride of zinc. If this falls on cellulose it turns it to a paste. It never evaporates and always takes up moisture from the air, and will gradually eat its way through quite a thickness of insulation. Whether it is acid or neutral makes no difference so far as its action on the insulation is concerned, though the neutral solution does not corrode the wire. Resin has the disadvantage, that it is not a fluid and is clumsy to handle. I have found that by shaking up powdered resin in very strong ammonia an ammonia soap is produced, which works well in most cases. The ammonia dissolves the copper oxide and evaporates afterwards, leaving the powdered resin, which is an insulator.

Apparatus can be protected from overheating by putting in the apparatus a small glass tube filled with carnauba wax. This melts near the danger point, but remains quite hard up till then, so that by imbedding a spring and contact in the wax, when the apparatus gets too warm the wax gives, and the spring expanding causes a short circuit which blows the fuse.

The largeness of the subject must be my excuse for the fragmentary nature of this paper. After I had begun it I found I had made a mistake; what I should have undertaken was to write a book. I trust, however, that some of the points I have developed may prove of interest.

*J. J. Thomson, "App. on Dyn. to Phys. and Chem.," p. 190.

At the annual meeting of the Citizens' Telephone Company, of Laconia, N. H., officers for the ensuing year were elected as follows: Directors, True E. Prescott, Henry J. Odell, Edmund Little, Dr. Alfred W. Abbott, John W. Ashman, John H. Dow, of this city, Herman J. Odell, of Franklin, William B. Fellows and Frank Proctor, of Tilton. It was also voted to declare a semi-annual dividend of three per cent.

The Telephone Situation in St. Louis.

In a recent issue of the *Globe-Democrat*, St. Louis, is published the following relating to the two telephone companies in that city:

A local financier yesterday called attention to the forthcoming fight for patronage between the Bell and Kinloch telephone companies, and ventured the opinion that all the business in sight is not enough to justify such an outlay of capital as the two will employ. From memoranda in his possession he made the following statement:

"The Bell has already issued stock of the par value of $1,300,000, and will shortly issue $350,000 more. It has no bonds outstanding. The Kinloch has issued $2,000,000 in stock and $2,000,000 in bonds. That makes $5,650,000 invested here. The net profits of the Bell last year were $100,000, out of which they had to pay $30,000 in royalties on switchboard and other patents. That wasn't a very fat return on the investment of $1,300,000. Now the Kinloch is to come in and divide the business, and undoubtedly there will be for awhile terrific cuts in prices. But if the two companies were to enjoy a net profit of $200,000 on their aggregate investments of $5,650,000 it would only be a little over three and one-half per cent, and that isn't enough, when you come to add depreciation and renewals to the charge upon the capital. I confess I don't see where two corporations employing so much capital are going to get the business to play for in a town of 600,000 people, or, for that matter, of 1,000,000."

A prominent broker, who says he'll have to use both systems as long as his competitors do, has been given to understand that the Kinloch people will furnish him free service during the life of his present Bell contract, which has yet 18 months to run, the only condition being that he will subscribe for the Kinloch when his Bell contract expires. He says, too, that the item of an extra telephone rental will not be allowed by any strong business firm or corporation to interfere with the question. They will use both systems for awhile, at least, as a measure of self-protection. "In other words," he added, "if my competitor up the street has both telephones I've got to have them, too; and I believe that's exactly the way the telephone people view it."

At the sesquicentennial celebration in Reading, Pa., last week, electrical effects played a prominent and pleasing part. On Penn street there were 5,000 16-candle-power lamps burning at once, covering an extent of one and one-quarter miles. This work was installed by the Reading Electrical Construction Company, under the supervision of Mr. A. V. Arrowsmith.

The British Volunteer Electrical Engineers.

The following is the text of a new circular issued by the Electrical Engineer (Royal Engineers) Volunteers, of London.

The headquarters of the corps are at 13 Victoria street, Westminster. The uniform will be the same as that worn by other Royal Engineer Volunteers, with such modifications as the War Office approves. Uniform will be supplied free to members. The corps will be armed with the Lee-Metford rifle. The training is divided into two kinds—military and technical. The military work consists of infantry drills, musketry, etc. The technical work includes every application of electricity to war, with the exception of telegraphy, and such other work as will be useful to an electrician or engine-driver in carrying out his duties, such as signaling; fitting, loading, priming and connecting up submarine mines; a certain amount of boat work, and knotting, splicing, etc. This work will be carried out partly in London, but mainly at defended ports.

In order to become efficient each member must attend a continuous training at a defended port for at least eight days each year. In addition, 12 hours' technical work must be done each year. For this purpose, each working day—after the first eight—of the continuous training counts as six hours; each half day, four hours. Or, these drills may be done in periods of one, one and one-half, two, two and one-half, three and three and one-half hours. The capitation allowance is £4. For each of the eight days of the continuous training an allowance of 5s. per member in camp is paid to the corps. This allowance will be primarily devoted to the maintenance in camp. Drills—both military and technical—are being carried out in London and Woolwich at present. Members from other districts will only be permitted to join on undertaking to make private arrangements to learn their infantry drill. Intending members are requested to study the conditions of efficiency.

Below will be found an extract from the rules of the corps: "5. Every enrolled member who is non-efficient in any year shall pay to the funds of the corps, on or before November 10 in that year, a sum equal to the government capitation allowance which he failed to earn. . . . The commanding officer shall have power to remit payment, wholly or in part, in special cases. 8. No person shall be admitted as member or honorary member unless proposed by one or more members of the corps, and approved by the commanding officer. 24. Any member wishing to leave the corps may do so on November 2, providing he shall have given notice of his intention not later than the 30th of the preceding September. Failure to comply with this rule shall render him liable for half the amount of the succeeding year's capitation grant. Note—Age limit, 17 to 47 years."

Intending members should write to the adjutant, Captain Brady, R.E., 13 Victoria street, S. W. who will supply all information. They should give their full name, address, occupation, and electrical qualifications. If they wish to join as engine-drivers, they should state their qualifications for that work. Every application must be accompanied by a reference to a member of the corps, or to some other person well known to the commanding officer. Before enrollment each candidate must be passed as fit by a medical officer. Every member shall be enrolled for three years at least. A member leaving before completing three trainings shall be liable to a penalty of £2.10s. (Note—The headquarters are open on week days from 10 to 4; Saturdays from 10 to 12. On Mondays and Thursdays at 8 P. M., in addition.)

The circular is signed by Major J. Hopkinson, F.R.S.

ELECTRIC LIGHT FLASHES.

At New Iberia, La., the electric light plant was totally destroyed by fire a few days ago.

The village council of Decatur, Mich., has decided to call a special election for June 27 for the purpose of voting on bonding the town for $6,000 for electric lights.

The Electrical and Engineering Company, of Cleveland, Ohio, has obtained a franchise at Covington, Va., for lighting by electricity, and will erect a plant immediately.

The Natchez, Miss., Light, Power and Transit Company has been incorporated with a capital stock of $300,000, for the purpose of erecting and operating electric plants for lighting and power.

The earnings for May of the Edison Electric Illuminating Company, of New York, inclusive of the high-tension systems, were as follows:

	1898.	1897.	Increase.
Gross	$246,794 10	$188,789 18	$58,004 92
Net	106,789 20	82,694 70	24,094 50
Gross, five months	$1,326,567 04	$1,055,905 59	$270,661 45
Net, five months	605,772 33	508,509 26	97,263 07

The lagoon and main court on the Trans-Mississippi and International Exposition grounds at Omaha are to be lighted entirely with incandescent electric lights, a feature which has never before been attempted at a similar event. There will be 8,156 lights with a combined candle-power of 163,120.

The Kane's Falls Electric Company, of Fort Ann, N. Y., has been incorporated with a capital stock of $25,000. Operations are to be carried on in the towns of Fort Ann, Whitehall, Kingsbury and Queensbury. The directors are Eugene L. Ashley and Elizabeth H. Ashley, of Glens Falls, and Elmer J. West, of Caldwell.

The plant of the Paris, Tex., Gas and Electric Light Company has been sold to Judge D. H. Scott, who represented one-half of the bondholders as attorney and the other half as trustee. The amount bid was $30,000. The same management will continue and several important improvements will be made, among which, it is said, will be an electric railway.

The Crown Incandescent Light Company, to furnish electric light in South Jersey towns, has been incorporated in Camden County. The incorporators are: President, Joseph P. Green; vice-president, Robert J. Barr; secretary and treasurer, John W. Pechin, and Lewis A. Repetto, Esq. The company is capitalized at $100,000, and the head office is at 911 Market street, Philadelphia.

The Edison Electric Illuminating Company, of Brooklyn, has increased its capital stock from $4,000,000 to $5,000,000. The debts and liabilities of the corporation are $2,312,118. Among the directors are Ethan Allen Doty, Edwin Packard, Darwin R. James, R. C. Peabody, Charles E. Crowell, E. Legrand Beers, Martin Joost, Julian D. Fairchild, Frank L. Babbott and George H. Southard.

At the annual meeting recently of the stockholders of the Pasadena, Cal., Electric Light and Power Company, the following board of directors was elected: H. Fisher, H. H. Sinclair, J. S. Torrance, Frank C. Bolt, E. B. Ellis. Later the directors organized by choosing the following officers: H. Fisher, president; H. H. Sinclair, vice-president; J. S. Torrance, secretary; Senator George H. Barker, manager.

The Mount Morris, N. Y., Electric Light Company is the defendant in a suit on trial before Justice Giegerich, in the Supreme Court, brought by William Malay to recover $20,000 damages. The suit is the outcome of a fall from a ladder. Malay alleges that on July 6, 1891, he was employed in repairing one of the company's lamps at 103 Park place. While thus engaged he received a shock from a wire and was thrown from the ladder to the ground, sustaining such severe injuries that he is permanently disabled. The company claims as a defense that the fall was the result of carelessness on the part of the plaintiff.

THE GENERAL ELECTRIC COMPANY'S CHICAGO OFFICE.

ITS WAREHOUSES, REPAIR SHOPS AND SELLING DEPARTMENT UNDER ONE ROOF.

In facilitating its relations with that large class of its customers located in the middle and northwestern states and dealing directly with its Chicago sales office, the General Electric Company has found the large warehouse and repair shop which it has established in that city of the greatest value. In deciding to keep in Chicago an extensive and varied stock, comprising every device, with but few exceptions, of its manufacture, the company has practically brought its great factories within reach of the West, and orders for material in any quantity may thus be filled without the delay in transmitting them to the factories, which would otherwise be necessitated. Moreover, the fact that in the same building as the warehouse is maintained a repair shop, completely equipped to carry out repairs of any kind, enables customers to have their machinery repaired without the cost of shipping it to the main works.

The warehouse and repair shop occupy a commodious and well-lighted six-story and basement building, abutting on the main lines of three great railroads—the Chicago & Northwestern, the B & O and the Wisconsin Central. It is also on the Belt line, which connects with all the other railroads radiating from Chicago. From these into a special spur by the side of the warehouse the cars of any of the roads may be switched, and the warehouse has thus the great advantage of shipment and reception of good in car-load lots to or from any point in the Union.

The top or sixth floor is devoted to the storage of unbroken packages of arc lamp globes, porcelain and glass insulators, insulator pins and cross-arms, armatures of the older types of machines, etc. On the fifth floor is stored a stock of incandescent lamps in original packages ready for immediate shipment, fan motors, arc lamp globes in broken lots, arc lamp carbons, etc. At the time of writing this the incandescent lamps of various candle-powers, voltages, etc., in stock, numbered roughly about 500,000, which number is kept constantly on hand by weekly shipments from the Edison Lamp Works of Harrison, N. J.

The fourth and third floors are laid out in floor bins and wall cupboards, the latter divided into pigeon-holes of

various sizes. Each bin and each pigeon-hole bears the catalogue number of the device or part it contains, and so well is all arranged that a boy could fill from the bins and cupboards any order for supplies, large or small. On the fourth floor are the larger wiring supplies and parts, arc lamps—single and double carbon, series and open and enclosed arcs for direct or alternating circuits; car resistances and meters and type "H" transformers of all sizes in the original factory boxes ready for reshipment at the shortest notice. In the bins on the third floor are the smaller wiring supplies and parts: fuses, sockets, switches, cut-outs, lightning arresters, arc lamp parts, dynamo motor parts, brushes, both copper and carbon, line material of all kinds, controller parts rheostats, assembled commutators, and a full stock of the new chloride accumulator motors, as well as a heavy stock of insulated cord and wire. To attempt to enumerate all the devices kept in stock in this warehouse would be to transcribe the supply catalogues of the General Electric Company; suffice it to say, that no order, however large or insignificant, but can be filled from this stock.

The second floor contains the repair shop, fully equipped with lathes, planers, drill presses and shapers, all driven by electric motors. The front part of this room is given up to the armature rewinding department. On this floor is located also an elaborate meter, lamp, and transformer testing department, as well as a dip-room and polishing-room for refinishing arc lamp casings, etc. On the first floor are stored all the heavy machines—generators, motors and the larged-sized transformers. This is also the shipping and receiving room for all the stock, and one corner is devoted to the office, while in the rear is a small carpenter's shop, with planer and a circular saw driven by a five-horse-power motor. An overhead track equipped with traveling chain hoists runs above this floor and out over both railroad tracks and the street, and greatly facilitates the shipment or reception of the cases of supplies or apparatus. Along one side run a number of large bins, each labeled with the name of a railroad or express line. In these bins are placed the cases for shipment, so that they may be shipped out rapidly without confusion or mistake. By a special arrangement with the express companies, four shipments, the last at 6 P. M., are made daily. Thus express orders leave the warehouse the day they are received at the office. The basement contains the power plant, consisting of two 80-horse-power boilers and two horizontal engines, one of 100 horse-power, used for dynamo-testing purposes, the other a 50-horse-power engine, belted to a direct-current machine, from which the lighting and power current used in the building is supplied, and to a 20-kilowatt alternator used for meter and other testing purposes. The basement also contains a boiler feed pump, a water heater, a large fire pump, four large steam-heated ovens for baking armatures, and dynamo field coils, and a switchboard divided into three sections equipped for testing high-tension series arc machines, direct-current, low-tension machines and alternating testing work. The load for the first consists of a bank of arc lamps, also in the basement; for the second, a large water rheostat under the sidewalk, and for the alternating section a large bank of incandescent lamps on the second floor. Beneath the sidewalk is kept a large stock of insulating oil for transformers. The different floors are connected by a four-ton elevator.

The repair shop is in charge of Mr. L. G. Crawford, and the warehouse was arranged and is under the care of Mr. Geo. M. Ellis.

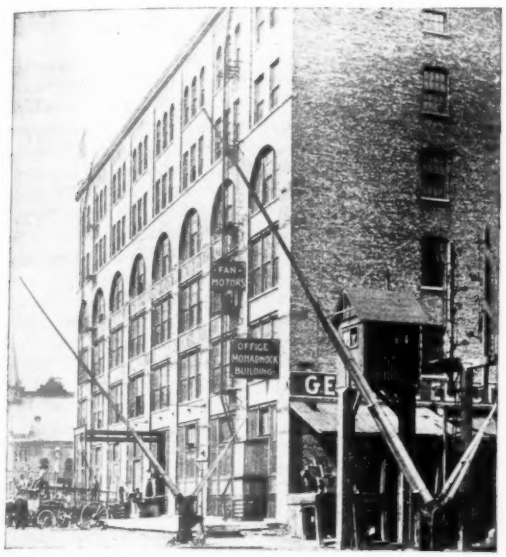


FIG. 1.—CHICAGO STOREHOUSE AND REPAIR SHOP, GENERAL ELECTRIC COMPANY.

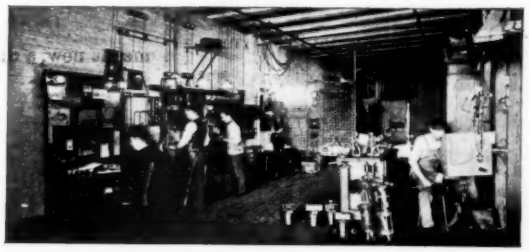


FIG. 2.—MOTOR AND LAMP TESTING DEPARTMENT.

FIG. 3.—CORNER OF WIRE, CABLE AND ORIGINAL PACKAGE STOREROOM.

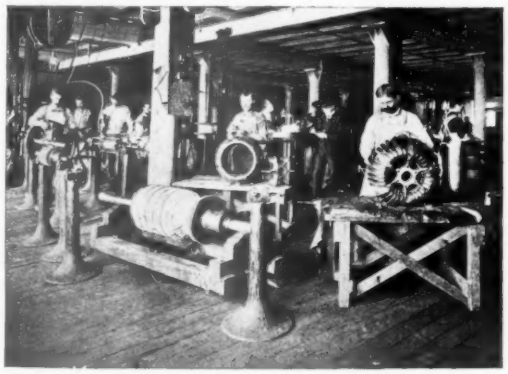


FIG. 5.—ARMATURE REWINDING DEPARTMENT.

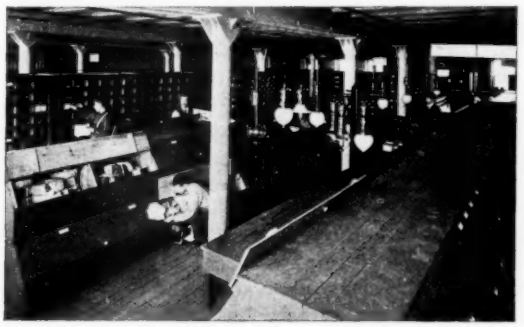


FIG. 4.—BINS AND CUPBOARDS FOR SUPPLIES AND PARTS.

Edison's Views on Lightning Rods.

Thomas A. Edison writes as follows to one of the editors of *Popular Science News* who had asked him whether lightning rods really furnish any security to buildings: "There is no doubt whatever that the lightning rods are a source of great protection when buildings are properly equipped with them. In doing this it is necessary to have metal of good conductivity and a perfect connection with the earth at the bottom of the rod. If you will refer to a book published by Sir William Snow Harris, who first introduced lightning rods in the British Navy and mercantile marine, you will find this subject discussed at length. Before the introduction of lightning rods in the British Navy, disasters at sea were quite frequent, and the subject of protecting their ships from this element of danger presented itself in a very serious light to British naval officers. When Harris proposed equipping these ships with lightning rods, he was almost alone in the belief that they would afford such protection as was desired. After a great deal of trouble he succeeded in having them adopted, since which I do not think there has been a single serious disaster from lightning in the British Navy, which is conclusive that Harris's theory was correct. The same applies to buildings of an inflammable nature erected on land, and when these are properly supplied with a sufficient number of lightning rods, dependent upon their size and the extent of ground covered by them, I believe they are absolutely safe from all danger."

Electrical Review

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

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Entomologists report that of late years the annual crop of flies is decreasing rapidly and steadily. The almost universal adoption of electric traction is credited with bringing about this desirable result. It has been stated that stables are the chief breeding place of flies, and as the street-car horse has been emancipated the number of stables is consequently growing less; hence the failure of the fly to be born in multitudes as in the past.

WAR TAX ON TELEPHONE AND TELEGRAPH MESSAGES.

It is expected that the war tax on telephone and telegraph messages will net the government an annual income of nearly $700,000. During 1897 about 60,000,000 telegraph messages were sent in the United States. If the same figures obtain during the ensuing year a tax of one cent a message will result in the government collecting $600,000. Service messages of railroad and telegraph companies are exempt from taxation. In 1897 about 900,000,000 telephone messages were sent in this country. The new tax of one cent a message applies only to toll calls costing more than 15 cents each. It is estimated that these average about one per cent of the whole, or 9,000,000 taxable messages, which would yield $90,000. The telegraph companies, it is believed, will require their patrons to affix a one-cent stamp to each written message. The telephone message tax will be collected as follows under the law:

"Telephone messages: It shall be the duty of every person, firm or corporation owning or operating any telephone line or lines to make within the first 15 days of each month a sworn statement to the collector of internal revenue in each of their respective districts, stating the number of messages or conversations transmitted over their respective lines during the preceding month, for which a charge of 15 cents or more was imposed, and for each of such messages or conversations the said person, firm or corporation shall pay a tax of one cent; provided, that only one payment of said tax shall be required, notwithstanding the lines of one or more persons, firms or corporations shall be used for the transmission of each of said messages or conversations."

The commercial development of the telephone has occurred since we have had a necessity for a war tax. It is a striking example of the inventive genius and progress of the United States that an industry springs up and developes in less than 20 years to such proportions as to render it amenable to taxation for war revenue.

A French scientist, Dr. E. Branly, is studying the similarity between the electric current and the impulse that travels along a nerve. He notes some special points of likeness between the conductivity of the nerves and that of masses of metallic particles or dust, which he calls "radio-conductors." While this question is not by any means new, a discussion of the matter is always of interest, especially when carried on intelligently. Priestly, as early as 1774, held that electricity and nervous force were identical. Readers of the ELECTRICAL REVIEW may remember that in our issue for February 20, 1892, appeared a very interesting article, entitled "Is Electricity Related to Nervous Force?" by Mr. J. J. Carty, of New York. In the light of these latest investigations, Mr. Carty's article, published over six years ago, acquires a new interest and value.

The army hospital ship "Relief," which will care for our sick and wounded soldiers at Santiago, is undoubtedly the finest vessel of its sort ever equipped. The ship is supplied with an electric plant which furnishes light and power and operates a large searchlight. Each of the several wards is supplied with electric fans, and the operating ward is equipped with the proper complement of X-ray apparatus. A refrigerating plant insures a full supply of ice. The "Relief" has been made ready for service in a remarkably short space of time under competent direction, and will undoubtedly return its cost many times over in the comfort it will afford our soldiers.

Our New York contemporary, *Electrical Earth*, was taken to task last week by the *Western Electrician* for publishing a reflection on Chicago as a convention city for the National Electric Light Association. We think the point well taken. New York and Chicago are the two cities that will naturally attract the largest attendance, and we believe that the association acted wisely in selecting them for alternate conventions hereafter.

ADDRESS OF PROF. ELISHA GRAY.

HIS REMARKS BEFORE THE NORTHWESTERN ELECTRICAL ASSOCIATION, AT DULUTH, JUNE 14.

Professor Gray: When I began my career as a so-called electrician there was no science in electricity. We knew nothing about ohms, amperes or volts, or any of those other peculiar terms which have grown up as the science has progressed. We had to do our experimenting just about as our mothers used to make cake. You know they did not have cook-books in those days, and they put about enough of this and that and the other together and made cake. Sometimes it came out good and sometimes it did not. If it failed, they did not know why it failed, and if it was a success, they did not exactly know why that was, either. That is about the way we had to conduct our experiments. We knew nothing about the relations of wires to magnets, resistance, etc. I remember when the first rheostat came into this country. It was a Varley rheostat with a differential galvanometer, and Charles H. Summers, of Chicago, electrician of the Western Union, had the first one. He used to carry it under his arm, and he was a great man. That was the beginning of ohms in this country—the beginning of the measurement of resistances. I have seen telegraph joints cut out that gave a measured resistance of 35,000 ohms, and yet they worked through those resistances in those days, but it did not dare to mist or rain the least bit, or the current was gone. We did not know then what was the matter with us.

I did not begin quite so far back as a certain professor of physics in my alma mater in its very early days, before the time of the telegraph, or at least before it amounted to anything. I do not think he had ever heard of it, but he was taking his class through a course of "electricity." It took him an hour one day. He showed the experiments of the frictional electrical machine and talked to them about Franklin having caught the forked lightning from the clouds, tamed it, and made it subservient to the will of man. You know how it goes, a regular Fourth of July speech, and then he said: "Young men, you were born too late to witness the development of this great science — electricity." (Laughter.) I often wonder whether, if the good professor is allowed to look down from his far-off home and see the progress that electricity has been making since his time, he does not often think of that little speech he made to the boys over 50 years ago, on the subject of electricity. I think I should, under the same circumstances.

We had no electric lights in those days, we had no electric railroads, we did not do our cooking by electricity, we did not read on the cars by electricity—those things were not thought of—we did not talk from town to town by electricity. I will quote a little poem as apropos of this

subject, entitled the "Difference Between the Now and the Then:"

"In the olden time, along the street,
A glimmering lantern led the feet
When on a midnight stroll;
But now we catch, when night is night,
A piece of lightning from the sky
And stick it on a pole.

"Time was when one must hold his ear
Close to the whispering voice to hear,
Like deaf men, nigh and nigher;
But now, from town to town he talks,
And puts his nose into a box
And whispers through a wire.

"In other days we took a car,
Drawn by a horse, if going far,
And felt that we were blest;
But now the conductor takes the fare,
And sticks a broomstick in the air—
The lightning does the rest."

(Applause and laughter.)

As I said before, I congratulate you that you live in this age. I congratulate you that you can begin where you are beginning in this science of electricity. We are apt to speak of it as just on the threshold or just "in its infancy." Well, it is a pretty healthy infant; yet, who is bold enough to say that it is not yet comparatively in its infancy? I do not know what the outcome is to be, but I am sure we have not reached the end by a long, long ways. I expect—no, I do not know as I expect to see it—but I think some of you may see it, and, if you do not, some of your children will see the time when we will have done away with the steam engine, when we will take the energy which is stored in the wood and the coal, directly as electricity, without having to put it through the steam engine and the dynamo for the various uses to which it can be put. I say, I think that that time is coming. It may not be reached in our lifetime, but it seems to me legitimate that we may look forward to that. However others may differ with me, I look upon electricity as simply one form of energy, energy in one of its manifestations, as heat is one of the forms of energy, and as light is one of the forms of energy, and mechanical energy, because we can transmute them from one to the other; we can make one take the place of the other; we can have it this to-day and to-morrow that, and why will there not be a discovery made by which this energy that has been stored by the sunbeam millions of years ago in the growth of wood and in the formation of coal-beds—why can we not take that out and put it into the form of electricity directly, without having the cumbersome method of putting it through the steam engine and the dynamo before it goes to the electromotor. I ask why. I think we are coming to that some of these days, and either this generation or, at farthest, the next will say good-by to steam. We will have no use for it. We will remember steam very affectionately for what it has been in the world and what it is to us now, but there will be no necessity for its use then.

I will not take up your time, but I thank you most heartily for this great pleasure that you have given me in being your guest from Chicago here. I thank you for all that I have learned from the contact with these young minds who have made electricity a study, and I shall always think of this occasion as one of the pleasantest of my life. (Applause.)

INDEPENDENT TELEPHONE COMPANIES.

ANNUAL CONVENTION IN CHICAGO THIS WEEK.

The second annual convention of the National Independent Telephone Association is being held at the Palmer House, Chicago, this week, and will continue until July 2. In addition to the officers and members of the advisory board, fully 70 per cent of the members are in attendance, showing the deep interest taken in the matter by the independent exchanges. Several subjects of importance are slated for discussion and action, prominent among them being the recent, seemingly concerted, action of the express companies in smaller towns, in politely ordering independent instruments removed from the express offices.

The officers at present are:

James M. Thomas, president, Chillicothe, Ohio.

H. C. Young, first vice-president, Columbia, Pa.; L. K. Hime, second vice-president, Oskaloosa, Iowa; Thomas Fricker, third vice-president, Ashtabula, Ohio.

W. J. Vesey, secretary, Fort Wayne, Ind.; G. W. Beers, first assistant secretary, Fort Wayne, Ind.; D. C. Dow, second assistant secretary, Cobleskill, N. Y.; L. A. Carr, treasurer, Durham, N. C.

Advisory Board: James M. Thomas, Chillicothe, Ohio; Wm. J. Vesey, Fort Wayne, Ind.; H. D. Critchfield, Mount Vernon, Ohio; C. R. Savidge, Sunbury, Pa.; J. C. Duncan, Knoxville, Tenn.; S. G. Higgins, Saginaw, Mich.; Hugh Dougherty, Bluffton, Ind.; Thomas R. Marshall, Keithsburg, Ill.; Edgar L. Miller, Frederick city, Md.

Death of Stanley S. Stout.

Mr. Stanley S. Stout, whose serious illness was announced in last week's issue of the ELECTRICAL REVIEW, died on the 18th instant at Chicago, his remains being cremated the Monday following, according to his last wish. Mr. Stout was born in Kentucky 48 years ago, his mother with two other children surviving him. During the last five years Mr. Stout devoted almost his entire time to the patent interests of the Western Telephone Construction Company, for whom he never lost a case. In his will Mr. Stout made this request: "After my death I desire and charge that my body be cremated in the most inexpensive manner and that the ashes therefrom be thrown into a lake, or stream of water, or upon a flower bed."

Canadian Electrical Association.

The annual convention of the Canadian Electrical Association will be held this week at Montreal, Que., on June 28, 29 and 30, in Convention Hall of the Windsor Hotel. The annual banquet will take place on the evening of June 29 at the Windsor Hotel.

Decisions in the Motor Suspension and Series Parallel Controller Cases.

In the case of the Sprague Electric Railway and Motor Company vs. the Hoosick Railway Company, Judge Coxe in the United States Circuit Court at Utica, N. Y., on June 7, ordered that a preliminary injunction be issued against the defendant, and that within 30 days from date the defendant file with the clerk of the court a statement showing that all the infringing apparatus had been removed from its cars. This decision involved the Sprague motor suspension patent No. 324,892.

In the case of the Sprague Electric Railway and Motor Company vs. the Nassau Electric Railway Company, of Brooklyn, N. Y., Judge Lacombe, United States Circuit Judge for the eastern district of New York, issued a preliminary injunction on June 20, which was served on June 21 against the defendant. This suit involves claims two and six of the Sprague motor suspension patent No. 324,892.

In the case of the Electric Car Company of America and the Thomson-Houston Electric Company vs. the Hartford & West Hartford Railroad Company, Judge Townsend, of the United States Circuit Court for the district of Connecticut, on June 13, denied a motion for the rehearing of the case which involved the Condict series parallel controller patent No. 393,323. In the same case on June 16, Judge Townsend handed down a decree for an injunction, in which it was held that the defendants had not infringed claims 1, 2, 3, 7, 10, 15, 16, 23, 24 and 30 of the patent involved, and that in respect of these claims the bill of complaint is dismissed. A perpetual injunction was issued against the defendant in regard to claims 20, 21, 22, 27, 28, 29 and 31 of the same patent.

Wall Street and the Electrical Stock Market.

There was a considerable improvement during the past week in the purchase of bonds. The certainty that the new government loan will be many times over-subscribed, and that applicants for large amounts are not likely to secure many bonds, made the purchase of even second rate securities of this character attractive. As compared with the final prices of Saturday a week ago the majority of stocks were higher. Western Union showed an increase of two points over the previous week, and General Electric gained ½ per cent, closing on Saturday at 38¼. Western Union closed at 93¾. In Boston, American Bell closed at 275 asked, and Erie Telephone and Telegraph at 68 bid and 69 asked.

Wall Street, June 25.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

OPENING OF THE FIFTEENTH GENERAL MEETING AT OMAHA ON MONDAY.

[*By Telegraph to the* ELECTRICAL REVIEW.]

OMAHA, NEB., June 27.

The annual meeting of the American Institute of Electrical Engineers was called to order by President A. E. Kennelly at 10.30 A. M. to-day. The attendance is fair, and many more are expected to-morrow. Among those present are Prof. Geo. D. Shepardson, Luther Stieringer, Francis B. Crocker, C. P. Steinmetz, W. F. White, E. J. Berg, W. E. Goldsborough, Dr. H. T. Eddy, Chas. F. Scott, Arthur V. Abbott, Harris J. Ryan.

The president of the City Council delivered the "keys of the city" amid applause, to which President Kennelly briefly replied.

President G. W. Wattles, of the exposition, extended a welcome and the freedom of the exposition grounds, and Chief of Publicity Rosewater followed in similar strain. President Kennelly responded to both and then delivered his address, and the first day's programme was then carried out as arranged.

The weather is ideal, and the excursions and entertainments provided much appreciated. C. E. K.

A Rhode Island Clambake.

General Manager A. C. White, of the Providence Telephone Company, invited a number of his New York friends to a Rhode Island clambake on Friday last. Among the guests were Mr. W. D. Sargent and sister, Mr. and Mrs. W. L. Candee, Mr. and Mrs. Geo. T. Manson, Mr. and Mrs. R. L. Daus, of New York, and Dr. Peckham and wife, Dr. Kenyon, Mrs. White and two sons, and Miss Fawn, of Providence. The Pomham Club, Providence, was the rendezvous, and the visitors participated in a genuine bake, such as only Rhode Island can supply and for which this club is famous. The suddenly developed clam-devouring ability of some of the visitors was so great that it was photographed on the spot, and may yet be immortalized in print. Mr. White also arranged two trolley rides, before and after the bake, through the city and suburbs of Providence, which were much enjoyed. It was with genuine regret that the party left his hospitable hands Friday evening, and one and all pronounced the occasion a red-letter day among outings of any and all kinds in their experience.

Heavy Electric Railroading Proposed in France.

An enterprise involving the expenditure of not less than 40,000,000 francs or $8,000,000 and the creation of a road about two and one-half miles long, partly underground, to be operated exclusively by electricity, is about to be undertaken in the city of Paris by the Orleans Railroad. The main terminal of this railroad, which operates about 4,300 miles of track in the west and southwest of France, is at the Place Valhubert, near the Pont d'Austerlitz and the Jardin des Plantes, in the extreme east of Paris. The traveling population of Paris does not live in the eastern part of the city, but in the western, in which direction the city is steadily growing, and access to the present Orleans station in most cases involves carriage transportation. The Orleans company has, therefore, decided to prolong its line into the very heart of Paris, and for this purpose has secured a right of way underground to a point on the left bank of the Seine, opposite the Garden of the Tuileries, where it will erect a terminal station Visitors to Paris, since the year 1872, have had the ruins of the Cour des Comptes pointed out to them as an example of the ferocity of the Commune; it is on this spot that the new Quai d'Orsay station of the Orleans Railroad is to be erected.

The new road will have two tracks, and will drop from the Valhubert station on a grade of 1.1 per cent towards the Seine. Here the river banks are in two stories, an upper quay or roadway and a lower quay, used as a dock or wharf for canal boats. A belt nine metres wide has been secured on this lower quay, and the line will follow this in the open for 650 metres. It will be an underground road beneath the upper quay for the remainder of the distance until it reaches the terminus under the Cour des Comptes. Openings in the wall side of the quay facing the river will afford light and ventilation. The rail level is about that of the normal height of the water—any seepage water in times of flood will be gathered in a sump and drained out.

The road follows the line of the Quais St. Bernard de la Tournelle, de Montebello, St. Michel, des Grands Augustins, de Conti, Malaquais and Voltaire to the Quai d'Orsay, passing the bridges Austerlitz, Sully, de la Tournelle, de l'Archeveche, au Double St. Michel, Nouf, des Arts, du Carrousel, Royal and Solferino. From the Pont Sully to the Petit Pont the underground construction will be a masonry arch nine metres span for a length of about 900 metres. From this point, for another 500 metres, the upper roadway will be carried by a metallic arch, and for the balance of the distance the masonry arch construction will be resumed with a span of about eight metres.

About halfway between the Place Valhubert and the Quai d'Orsay, between the Petit Pont and the Pont St. Michel, a station will be built, known as the station du Pont St. Michel. The Quai d'Orsay station—the terminal station—will lie between the buildings of the Caisse des Depots et Consignations and the Palais de la Legion d'Honneur, and between Pont Royal and the Pont de Solferino. It has been designed by M. Sabouret, chief engineer of the Central Service. The Orsay station will have 15 tracks, any one of which can be used for arriving or departing trains. According to the present plans, the three tracks nearest the river will be used for side tracks, the next four tracks for the long-distance departing trains, the next two for arriving and departing suburban trains, the next two for arriving long-distance trains, the next two for arriving and departing suburban trains and the last two for station service.

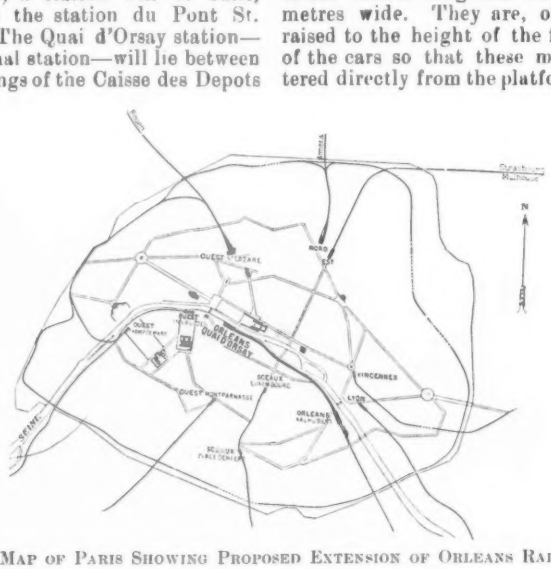

FIG. 1.—MAP OF PARIS SHOWING PROPOSED EXTENSION OF ORLEANS RAILROAD.

The platforms of the Pont St. Michel station will be 230 metres long. Those of the Quai d'Orsay station 185 to 240 metres long and six to seven metres wide. They are, of course, raised to the height of the footboard of the cars so that these may be entered directly from the platform. The arriving traffic will come in from the Rue de Bellechasse and the Rue de Lille and the departing traffic will be concentrated on the Quai d'Orsay. A number of elevators will be installed to facilitate movement of passengers and baggage. The rail level is 25 feet below the street level and the company has not been obliged to purchase the title to the surface, the structure overhead being carried by a metal roof construction guaranteed by the company. The building above the station will probably be occupied by a large hotel and will, of course, be in harmony with the buildings in its vicinity. The designs of M. Laloux have been selected and approved by the Minister of Public Works.

A short distance west of this station is the terminal station of the Ouest Railroad at the Invalides, and still further west is the small station of the Champ de Mars, the former a part of the main line of the Ouest Railroad, the latter an offshoot from the Ceinture or Belt line which encircles Paris. These stations will probably eventually be joined to the Quai d'Orsay station of the Orleans road, thus uniting the Ouest, Ceinture and Orleans systems.

In driving the underground tunnel, the Orleans Railroad will operate without interference whatsoever with the street traffic. The earth overhead will be supported by a metal shield pushed forward by hydraulic pressure and followed closely by the masonry. The method is similar to that employed in building the great sewer recently laid down in Paris.

The operation of this underground road, as at present contemplated, is to be carried on by means of electric locomotives driven by continuous current at a pressure of between 500 and 700 volts, using the third-rail system of contact. In asking for estimates, however, the company has requested bidders to submit plans also for the use of systems of generation and distribution other than that just mentioned. The locomotives are to be eight in number, all alike, and able to haul a train of 250 French tons in seven minutes between the stations of the Quai d'Orsay and the Pont d'Austerlitz without stopping at the intermediate station of the Pont St. Michel. This means a speed of 45 kilometres an hour. The locomotives should not only be able to haul a train of the weight mentioned on a grade of 11 millimetres, and on curves of 200 metres radius, but it should also be able to haul trains as heavy as 300 tons at a slower

FIG. 2.—TEST TRAIN AT SCHENECTADY, N. Y.

speed. The locomotives must be built to move in either direction at the same speed, and be of a length to allow them to be turned on turntables 6 metres 20 centimetres in diameter. They are to be equipped with motor-driven air pump and air brakes.

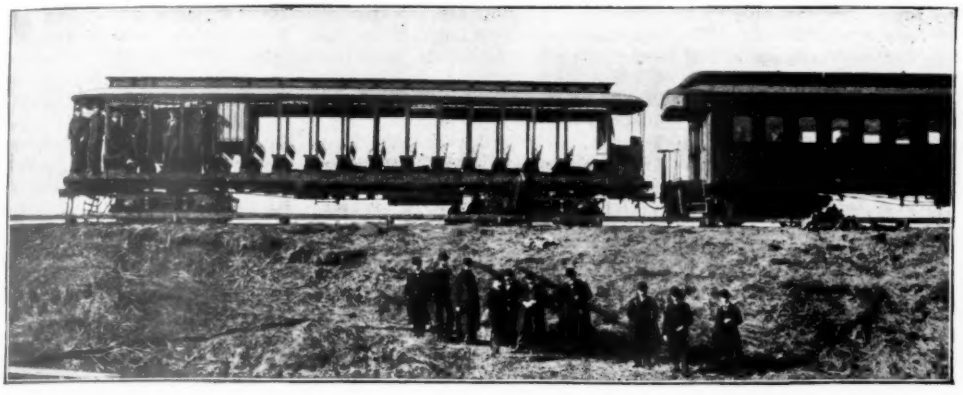

FIG. 3.—GROUP OF ENGINEERS, ORLEANS RAILROAD MOTOR CAR OF TEST TRAIN ON TRACK.

The electric generating station will be placed at the western end of the Valhubert Station departing platform, taking the place of certain waiting rooms. The equipment is to be of sufficient capacity to allow of the simultaneous movement of four 200-ton trains, exclusive of the locomotive, upon the line—one starting from the Austerlitz Station, one from the Quai d'Orsay Station, the third climbing the grade of 11 millimetres, and the fourth running between the Pont St. Michel and the present main station. Furthermore, the generating plant must include sufficient lighting capacity for three stations, already mentioned, and the tunnel, as well as for the station and shops at Ivry. The current is to be taken by the locomotives from an insulated third-rail at the side of the track in the stations and between the tracks over the rest of the line, due provision being made for all switches and crossovers.

In order that a better knowledge of the operation of electricity in heavy traction service might be gained than was possible in Europe, the Orleans Company recently sent over to America a corps of engineers to investigate the different electric railway installations of this type in this country. The party was headed by M. E. Solacroup, assistant chief engineer of material and traction, and M. Sabouret, already mentioned; the other members being Messrs. Fiberty, Fremenville and Walton. Their inquiries were conducted very quietly, but during their short stay they were able to visit almost every installation of special interest to them in the United States.

The investigation was begun at Hoboken, where an electric locomotive is hauling all the freight service between the transatlantic docks there, and the West Shore and Erie railroads. From there they visited Baltimore to inspect the great electric locomotives which operate the entire traffic of the B & O Railroad through the Belt Line tunnel in that city. From Baltimore they went to Chicago for the purpose of observing the operation of the electric elevated railroads and, returning East, passed through Cleveland, Niagara Falls and Buffalo, where they had an opportunity of studying the employment of the electric car in high-speed interurban service.

From Buffalo they traveled to Boston, where they were met by C. P. Clark, president of the New York, New Haven & Hartford Railroad, and Col. N. H. Heft, chief electrician of the same road. They traveled over the Nantasket Beach branch of the New Haven system, between East Weymouth and Hull, and inspected the power-house. Returning, they visited the third-rail electric system between Berlin and Hartford, Ct., opened for traffic last Summer, and rode on the 30-ton electric locomotive operating between factories at New Haven and the Cedar Hill junction.

A special test was arranged for their benefit at Schenectady on the experimental two-mile track of the General Electric Company, the conditions of the track and load being, as far as possible, similar to those which will obtain on the line in Paris. A length of track was marked off 1.11 of a mile long, by two white flags, corresponding to the distance between the Quai d'Orsay and the Pont St. Michel stations, the most difficult portion of the proposed Orleans extension. According to the time schedule arranged for the operation of the road, this distance should be covered in three minutes and 50 seconds. A train was made up of a motor car of the Nantasket Beach pattern, equipped with four General Electric 55-175 horse-power motors as locomotives, several New York Central coaches and seven flat cars loaded with pig iron, making a total train load of 320 tons, including the motor car, which weighed 45 tons. The run between the flags, including starting and stopping, was made easily in three minutes and 25 seconds, giving a margin of not less than 25 seconds to the good. The diagram on this page shows the acceleration curves of this run.

The question of rendering the third rail innocuous after the passage of the train having been brought up, and the conditions of the General Electric system of surface contact almost exactly reproduced. By this system the arrangement of circuits is such that the sections into which the rail is divided may be of any length from that of a few feet to any number of miles; that is, any section of the conductor rail will be alive only when the train itself is running over that section. The instant the train passes to the succeeding section, that which it has just left becomes dead and absolutely innocuous. The use of this system also renders it possible to "section" the conducting rail at stations, leaving it continuously alive at all intermediate points. The switch cutting the dead section into circuit is closed as the contact shoe of the train comes into contact with the conductor, energizing it, and is automatically opened as the train passes to the next dead section.

The motor car was run over that part of the track beside which the third rail was sectioned, and as a visual means of indicating that the third rail was alive a number of incandescent lamps on the top of the boxes containing the switches were connected to the conductor. As the car reached the sections and rendered them alive, the lamps lighted up, being extinguished as the contact shoes passed over the dividing lines between the different sections.

These tests formed the subject of the concluding investigations of the French engineers in this country. A few days before their departure a dinner was tendered to them at Delmonico's, at which many prominent railroad engineers and electricians were present to meet them. They admitted having received many new ideas during their stay, and return to France convinced of the use and possibilities of electricity as a motive power, especially in the field of heavy traction.

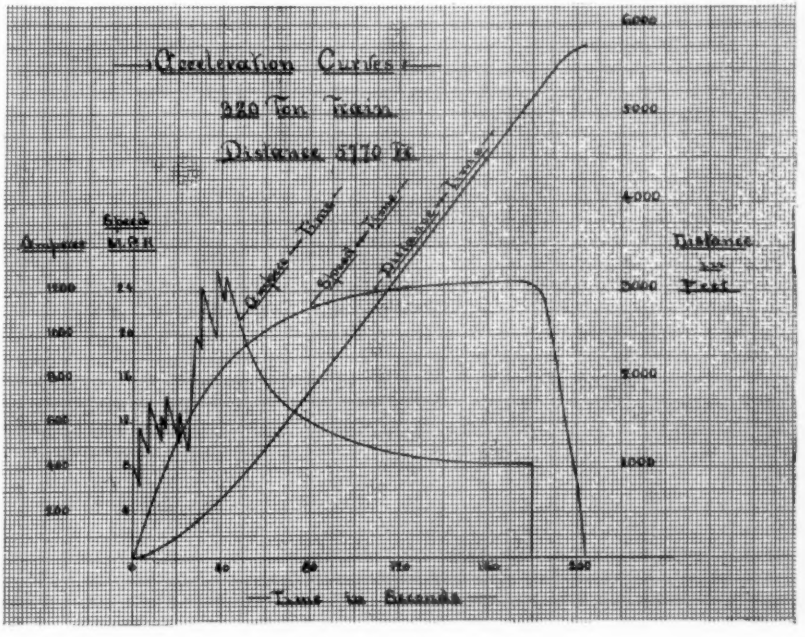

FIG. 4.—CURVE OF SCHENECTADY TEST.

A Welsbach Electric Light?

[*From the Boston News Bureau.*]

The Welsbach Light Company is to enter the electric lighting field and has perfected an electric incandescent burner which it is claimed is as far superior to the ordinary electric incandescent burner as the Welsbach gas burner was to the old-time gas burner. Baron Von Welsbach, the inventor of the Welsbach gas burner, has after years of work produced this new electric incandescent burner, and the Welsbach Light Company will control a new company which will conduct the new business in connection with the Welsbach Light Company's present business.

NATIONAL ELECTRIC LIGHT ASSOCIATION.

DISCUSSION AT THE CHICAGO CONVENTION OF MESSRS. WAGNER'S AND FERGUSON'S PAPERS ON CENTRAL STATION PRACTICE.

Mr. Thayer: Does Mr. Wagner regard it as advisable to obtain an extremely close regulation; that is, a regulation within one per cent, or is it better to have a slightly poorer regulation and more iron loss? How does Mr. Wagner do away with the difficulty of the excessive drop in the large conductors carrying the secondary currents proceeding from the large transformers?

Mr. Wagner: I mentioned in the paper that by making the transformer practically an integral part of the feeder, we eliminate all the effects of transformer dropping, just as we do our feeder dropping by regulating the pressure wires from the feeder terminal, which become the secondary terminals of the transformer, so that we can sacrifice the regulation of the transformer to secure a very low iron loss; but a poorly regulated transformer is very much better for use in a system where transformers are connected in multiple, provided the pressure for each transformer can be regulated independently. The transformers of very close regulation, one per cent or under, are connected in multiple with 200 or 300 feet of mains, or more, in between. Unless the resistance of the mains is extremely low, the transformer will not handle the load unless it is uniformly distributed along the main. In such a case the transformer nearest the load will take practically all the load, so that for good distribution of load between the transformers poor regulation is desirable, provided that regulation does not affect in general the regulation of the system, and it is so modified that it will not do that, by making the potential of each transformer to be regulated independently by feeder regulators at the station, manually operated. The changes of loads are slow enough so that one mechanic can take care of them.

Mr. Van Trump: What is the objection to cutting the feeder transformer off the line automatically, and saving the underload losses during underload?

Mr. Wagner: The object is to make the underload losses so small that it will not be necessary to do that. That would complicate the operation of the system very considerably, both in the matter of attendance and the use of switches and automatic devices, which are not as a rule to be depended on. In the system described, the highest efficiency is at the average load, so that if a transformer and its feeder were cut out, it would decrease the average efficiency rather than raise it, as it would increase the load on the other feeders, increase the copper losses in the other feeders and other transformers, and that increase in copper loss would be greater than the iron losses which you sustain temporarily. The object is to design a system to be most efficient at the average load. With a transformer that can be accomplished successfully.

Mr. Robinson: What is the wattless current loss?

Mr. Wagner: The wattless current is inappreciable. The volt-amperes and the watts correspond so nearly in any alternating station at full load that the increase is almost inappreciable, even in the most poorly designed station. The power factor is very high at maximum loads, and with a system of this kind the power factor should be practically 100 per cent at all times, except for alternating motors, which lower it slightly. The part of the load that comes on the peak is principally incandescent lighting. The motor load is almost constant and the arc lighting load is much more nearly constant than the incandescent load. The wattless current is small compared with the other current, in any event, and it is found in large alternating-current generators that they can be operated with a considerable increase of current in armature without materially increasing the temperature of the machine for short periods, as the greatest losses in the generator do not originate in the copper of the armature, and that can be very greatly overloaded without affecting the maximum value of the machine.

Mr. Dow: Mr. Wagner states the feeder loss in case No. 1 is 24 per cent. That is an exceptionally high feeder loss. It is not radically different from the feeder loss in Mr. Ferguson's paper, 22.8 per cent, but that includes the tie-line losses over an Edison three-wire station located much further from the maximum load than his customer. I think that, taking the average of Edison stations, and this is assumed to be a representative three-wire direct-current station, the feeder loss is more nearly 12 to 14 per cent. I am familiar with one station where the feeder loss is under 12 per cent, others 15 per cent. As to the 24 per cent loss I can not think of any station except possibly the Chicago station with their tie line included, where the feeder loss would approximate that. A slight modification in the feeder losses will completely change the pressure of the two currents, Nos. 1 and 2. It will place No. 1 above No. 2 throughout its entire length. I think that 24 per cent loss in general will bring the cost of the feeder itself, particularly the cable feeder which is now standard, to not much more than the cost of feeder transformers, which Mr. Wagner proposes to employ. The transformer with a cable feeder, capable of carrying 100 kilowatts, can be bought for something like 90 cents a running foot; that is, of course, cheap construction, but it is a good figure to compare with the cost of a transformer which is proposed to be used in place of and to avoid the great expense of that feeder. A transformer for 100 kilowatts will cost $1,000 to $1,200, and the initial advantage of $1,000 in favor of the direct-current system will pay for a great deal of copper, and the permanency of the one investment as compared with the other is much in favor of the direct current. Taking again the figures given the loss in mains is assumed to be two per cent in both cases. Now I rather take exception to that with the conditions of load which will prevail in such a station as the representative Edison station; viz., with a large motor load and very respectable arc lamp load. Under those conditions, the fact which Mr. Wagner has noted in his paper, that the drop in the alternating current main or feeder is not proportional to the current, which he sets forth as follows: "It would be quite perfect if the drop in alternating-current lines were proportional to the current, but it is not," will certainly affect the quality of the investment between mains for direct current and alternating current. To get the two per cent regulation in the mains will certainly under the conditions of the representative Edison station involve considerably more investment if the supply is to be by alternating current.

The question as to arc lamps as discussed by Mr. Ferguson, and the statements made in his paper, can be applied directly to answering Mr. Wagner as to the quality of the two systems in these respects; and I wish to accent strongly Mr. Ferguson's statement that the electric elevator, which Mr. Wagner says is just now a difficult and unsettled problem, for the alternating-current station is of primary importance to central station interests. If you are not able to give good elevator service you will have to submit to the establishment of many isolated plants. It is a strange sequence that if a man has to keep an engineer on his premises, a steam boiler and a steam pump for the purpose of running an hydraulic elevator, he will add a dynamo and an engine to supply his own light. On the other hand, if you can furnish him good elevator service at a reasonable rate, the necessity for the engineer and for the high-pressure steam is eliminated; and in that very point lies the possibility of blocking the establishment of isolated plants. In my case, to lose the elevator service would not be a serious matter as far as the elevator bill is concerned, but the incidental loss, due to a good deal of valuable lighting, would be very serious indeed. I should say that Mr. Wagner has shown what a great many others knew; that the alternating-current service can be wonderfully improved above its customary standard; that it can be brought up closer to the standard heretofore set by the direct-current stations; but that it is still, unless in most exceptional stations, an inferior service for the conditions which Mr. Wagner has defined as those of the representative Edison three-wire central station. In the case of a densely populated district demanding the greater portion of the total supply, the direct current is unquestionably the best; a less densely populated section might be supplied by the alternating system, or it can be supplied, as Mr. Ferguson has suggested, by an alternating distribution and direct current.

Mr. Scovil: On page 23 of Mr. Wagner's paper occurs this statement: "I might say that where lighting is a distinct feature, and first-class service is to be rendered from a large station, the three-phase system can not be used successfully." If there is any technical gentleman who takes an opposite view on that question I hope he will give us the benefit of his experience and judgment.

Mr. Rice: I have visited the stations at Salt Lake City and Sacramento and spent several days with the designing engineers of both cities, and they both claim superior efficacy and elasticity to the Edison three-wire sytem. They have the three-phase four-wire distribution system in the Salt Lake plant, considerably over 10 miles—I think about 15—and at Sacramento it is nearly 20 miles. I wish to say in discussion of the two papers that it seems to me the feature is brought out that we are comparing two systems, one of which is brought to a high state of development, and one of which is just beginning to be developed. I think Mr. Ferguson's example of the alternating plant is very unfortunate, in that it does not represent an alternating plant of the latest design. It is now past discussion that alternators may be thrown in parallel, the same as continuous-current generators. The use of motors is another feature which is coming into prominence. The alternating-current motors have not been developed and applied the same as continuous-current motors, simply because they have not lived long enough. In time I expect to see alternating-current motors distributed as widely and as universally as continuous-current motors. The same idea applies to the arc lamp. We have had arc lamps for a great many years on the continuous-current system, but only recently have they been developed and made acceptable on the alternating-current system.

Mr. Pillsbury, St. Louis: I wish to say a few words in regard to the alternating-current motor, having been identified for several years with the development more especially of single-phase machines. The question has been raised as to their power factor by one gentleman, as to their practical success by another, and as to their adaptability for the direct driving of elevators by several. Single-phase alternating-current motors are now made equal, if not superior to direct-current motors for general power distribution. The power factor in a well designed machine may be considerably above 90 per cent, from 50 per cent to 150 per cent of its rated capacity, and above 80 per cent, while the motor is developing 20 per cent of its rated output. For general power distribution these are superior to direct-current motors in point of care and attendance required, average efficiency, absence of wear, etc. To the direct driving of elevators they have not as yet been applied, but there is no reason why they can not be adapted to this work

as soon as a sufficient demand shall have arisen. The only problem met with in their application to this class of service is that of starting. There are two methods of doing this, one by splitting the phase and another by introducing a commutator. Either of these is entirely successful. The latter is the more efficient and for general power distribution is undoubtedly to be preferred where an excessive starting current is objectionable because of its likelihood to produce a fluctuation in the pressure at seven and one o'clock when many motors are being started at once. It is, however, not well adapted for elevator work because sparking can not be altogether eliminated from an alternating-current commutator. While this spark is not objectionable where the machine is started only occasionally, it would be decidedly so in the case of an elevator starting many times a day. The other method, as at present developed, gives ample torque, but at a comparatively low efficiency and by the use of a large current. The efficiency of a direct-current motor, however, is also low in starting, and ofttimes the current consumed is excessive. I apprehend, however, that inasmuch as not all the elevators have to be started at once this is a matter of comparatively small importance to the central station. It may be confidently affirmed that single-phase alternating-current motors are now on the market superior to direct machines for general power distribution, and that in the near future they will be adapted to such special work as the direct driving of elevators with entire success.

Mr. Insull: Gentlemen, I operate a company which is in no sense wedded to one system or another. Within the last week I have shut down a three-wire Edison system. I would like within the next week to shut down an alternating system. With us it is simply a question of the most money we can possibly make out of a given investment. I think if you will study Mr. Ferguson's paper you will find that he has gone into this question not merely from a theoretical point of view, but his observations are based upon the actual results obtained in a year's operations of a large property. This property has been in existence some 10 years. If you study Mr. Wagner's paper you will find that he presents to you for use in our large cities, principally—as his paper is based upon operations in a large city—a new scheme that has not stood the test of time, and that can not be set up in comparison with the low-tension system until a company under Mr. Wagner's plan has developed their business to a point where you can make a comparison of investment with investment, expenses with expenses and return with return. I know that most of you gentlemen here are alternating men, and that you look upon me as a low-tension man. But I would remind you that exactly what Mr. Wagner has stated this morning with relation to the advantage of an alternating distributing system as against the present three-wire system, was stated for different reasons, of course, with relation to the alternating house to house system that you are now using, as against the three-wire system, some 10 or 12 years ago. Mr. Wagner referred to the use of storage batteries. I may say that I agree with him to some extent. He says in his paper that you may ask as to whether storage batteries have not been proved to be a valuable adjunct to the central stations, cost and maintenance considered. I would ask him whether his proposed system of alternating distribution has yet been proved to be a more valuable adjunct to the central station as compared with the three-wire low-tension system? So far as the Chicago Edison Company is concerned and its use of the storage battery, as the battery only went into use yesterday, we are not in a position to say much about it at the present time. We are to some extent trying an experiment. It is true that it is an expensive one, but still it is an experiment. Recently one of the electrical journals quoted me as having changed over from an opponent to an advocate of storage batteries. They were a little previous in making that statement; but I can say this, that one of the primary reasons in our deciding to use a storage battery was the difference in the investment costs between the battery and the construction of a trunk line that would have had to take its place. That is an important factor, as I said before. Interest cost comes in in all these matters. It is a question of conditions.

Mr. Stetson: We are running mostly the Edison system and the alternating system, and I am sure that I do not know which one we want to spare. We want them both. I think it is a very good combination. We extend our light into a neighboring community, running four or five miles. We certainly could not do that on the Edison system, and whether it is a matter of the great economy, or the difference in economy, it is the fact of getting your money after you have a station established. The cost of a few more lights is generally the cost of the coal; that is, your interest and labor is a fixed amount, and if you can add outlying districts by any system, it seems to me it is a good idea to be able to use that system. We find that it helps us in our income to take on this load of a neighboring city that would be entirely out of our reach with any other system than the alternating system, on account of the small service required, and the prohibitory factor of supplying that amount with an expensive output of copper, so that I do not know if a man makes a mistake if he has both. I was pleased at the remark of our president this morning, when he recommended that the alternating interests should establish themselves in some large community and prove their statements. If he will give us a record of any large community, like New York, Chicago or Boston, where the Edison company have not already obtained all there is in it, I presume the other people will be glad to go there and set up a plant.

Mr. Van Trump: I ask a question—on page 6, of Mr. Ferguson's paper, he speaks of the maximum pressure being 149 volts, and the average pressure of all stations, 126.2. From that he figures that his average efficiency of distribution is 91.2. It seems to me with the 149 volts as a maximum pressure, that the watts loss at the time of maximum load would form a very much larger proportion of the loss on an Edison station than the mean volts would indicate. I think the watts lost would be much larger than 8.8 per cent.

Mr. Ferguson: The table of the efficiency of distribution is arrived at by taking the ratio between the pressure delivered at the customer's meter and the average station pressure for the year, which is 115 divided by 126.2 volts. The maximum station pressure, at the time of maximum load, has nothing to do with the case. That is 149 volts, and is maintained for a short period of time. The true calculation is obtained by considering the average station pressure as I have given it.

The Atlantic Cable Directory.

"The Atlantic Cable Directory of Registered Addresses and Directory Code" contains a directory of registered cable addresses of the United States and Canada, the names of individuals and firms being arranged alphabetically by states, cities, and names, and also classified under the proper business headings. It also contains a telegraph and cable code of about 115,000 code words. The officers of the Atlantic Cable Directory and Code Company, which company is publishing the book, are officials and employés of the Commercial Cable and Postal Telegraph companies, and this fact in itself is a guarantee of the character of the book. The Commercial Cable Company has guaranteed that 100,000 copies will be printed and circulated, the bulk of them going abroad to be placed in hotels, exchanges, steamship offices, clubs, and other public places, as well as in the hands of leading business houses.

The code is so arranged that almost any amount in American, English, French, German, Italian, Russian, or Spanish currency may be expressed in one word, and one word may also be found to express any quantity, weight or measure in the English or metric systems. In the plan and arrangement of the code a radical departure has been made from methods followed by makers of other printed codes heretofore published. Instead of following the old plan of grouping the phrases under subject headings, the compiler has first condensed plain English sentences by eliminating the articles and less important parts of the verbs and has then broken them into combinations of words ordinarily in use. The phrases thus formed have been arranged in alphabetical order and may readily be combined into complete sentences. In short, the directory code is a dictionary of word combinations, although the more useful common sentences and phrases have been included. This is an improvement over the general codes now in print. The entire work is very creditable, and is by Mr. Chas. P. Bruch, of the Postal Telegraph-Cable Company.

How To Subscribe for the New War Bonds.

United States bonds are recognized as the most secure and stable form of obligation that investors can hold. They are attractive, not only because of the absolute security offered, but because there is at all times a public market for them on which holders can quickly sell; and they also offer the most desirable form of collateral if the holder wishes to secure a temporary loan. The fact that United States bonds are not subject to taxes of any character—federal, state or municipal—is a valuable feature of that form of investment. United States bonds are issued in both coupon and registered form.

The war loan which is now being offered will be sold to subscribers at par during the period of subscription, which ends July 14, 1898. The method of subscription has been made as simple as possible. Blank forms may be obtained at every money-order post office, and at most of the banks and express offices, and on these forms is clearly indicated all that it is necessary for the subscriber to fill out. The subscriber may himself mail to the Treasury Department at Washington the blank form filled out, together with his remittance covering the par value of the amount of bonds for which he wishes to subscribe. That remittance may be in whatever form best suits the subscriber's convenience—in currency, bank draft, check, post-office money order or express money order. The day the currency is received, or the day the proceeds are received from the checks, drafts or money orders, the subscription will be entered and will immediately begin drawing interest. When the bonds are delivered a check will accompany each delivery covering the interest at three per cent from the day the subscription is entered to August 1, the date of the bonds, and from which date the bonds will carry their own interest.

The Telegraph Censorship at Key West.

The Western Union cable office at Key West has been the most interesting spot on the island since the war began, says the *Journal of the Telegraph*. The most important man is the censor. One naturally comes to associate the two together.

The cable office is a small brick building, two stories high, with a large cocoanut palm growing on either side. The palms spread their great branches above the building and form a perfect arch over the red-tiled roof. Great clusters of cocoanuts are suspended from the green arch. It is only a few yards from the door of the cable office to the government dock. In fact, it is only a few yards from any point on the island to the water, and when the tide is at the highest point, the sea sets back through most of the streets, and leaves a white fringe of salt along the gutters when the tide goes out and the salt-soaked earth dries.

Up through the narrow street which leads from the cable office to the wharf some very interesting and exciting races have taken place during the past few weeks. When the newspaper dispatch boats come in from the Gulf they always land as near to the cable office as possible, and when correspondents land at the same time the race for the cable office is more interesting than any steeplechase ever run. Some of them, after a long cruise, go staggering and reeling on their sea legs like drunken men. Others are weak from seasickness, and still others are limping from bruises received from being pitched about in the rough sea. But sickness and bruises are forgotten when land is reached, and every effort is put forth to be the first to file copy.

If it be late at night, five seconds gained in the race from the dock to the cable office may mean an exclusive story for one of the great dailies in the North. Cable transmission is necessarily slower than sending over land wires, and the correspondent who files 3,000 words at midnight is pretty sure that no other paper will be able to get anything for its morning edition from Key West that night.

But after the copy has been filed the correspondent's trouble is not at an end. Every word of it must be read and passed upon by the censor. No matter how much time, hardship or expense it has required to get the story, if, in the judgment of the censor, it ought not to be printed, it can not be sent.

If it gives any information as to the movements of the fleet or the army it can not go.

There are something like 150 newspaper correspondents in Key West, and while most of them appreciate the wisdom of the government censorship of news matter, some have grown impatient in their eagerness to tell the interesting stories that are to be told, and have tried all manner of ingenious schemes for getting matter past the censor. Usually, however, all plans have been detected by the censor, and the apparently innocent or stupid dispatch has been returned to the writer with "No" written in red ink across it.

The most trying period of the correspondents was on the day the fleet started on its cruise eastward.

Every correspondent in Key West knew that the great battle-ships were steaming away from here for Havana in quest of big Spanish game. Every newspaper man was eager to send the story, but not a line, not a word would the censor permit to pass. From 100 papers in the North came the query, "Has the fleet started?"

Even the answer "yes" to this inquiry was not permitted to go.

Catalogues in the "Vernacular."

We have expressed ourselves strongly as to the necessity of British manufacturers, electrical and otherwise, sending out their foreign price lists in the language and the currency of the countries for which they are intended, and we learn therefore with the greatest pleasure, says London *Lightning*, that the business literature of certain English houses has earned recently special praise from South America on account of the excellent Spanish in which it has been circulated. In proportion as this plan is carried out will be the success of British goods in various foreign markets, which will naturally give the preference to commodities whose description and prices are placed before them in their own tongue. This is the secret of the ever-widening competition of Germany in markets so long considered almost the freehold of British trade. If English buyers received from Germany trade circulars in German they would throw them aside. But the Teuton it too wise for this, and though we quiz his queer English, we can never assert that we don't understand it, and his pluck and pertinacity are only too successful for the peace of mind of his English opponents. This is going on all over the world, and the only method of successfully coping with it is the sincerest form of flattery—imitation.

Signal Men Wanted for the Army.

Capt. Edward Bernard Ives, recently appointed and confirmed a captain of volunteers, has undertaken to secure recruits for the Signal Corps in New York and Brooklyn. Fifty men are wanted. Preference will be given to applicants from the Signal Corps of the National Guard. Under the law, two-thirds of the entire number of recruits required must be skilled electricians and telegraphers. Each week-day Captain Ives may be found at the Seventy-first Regiment armory, Park avenue and Thirty-fourth street, from 9.30 to 11 A. M. In the afternoon he may be found at the armory of the Second Signal Corps of the State National Guard, at 801 Dean street, Brooklyn.

The following circular of information has been issued by Brigadier-General A. W. Greely, chief signal officer of the United States Army:

The Act of Congress approved May 18, 1898, authorizes the President to organize a volunteer signal corps for the existing war. It is provided that each organized division of troops may have two captains, two first lieutenants, two second lieutenants, who will be appointed and commissioned by the President.

The number of enlisted men with their monthly rate of pay is as follows:

5 first-class sergeants...	$54 00
10 sergeants.....	40 80
10 corporals.....	24 00
30 privates.....	20 40

In addition to the above, each enlisted man will receive rations, clothing, and quarters in kind, and medical attendance when required.

Enlistments are not made by the Chief Signal Officer, but applications must be made to officers commissioned in the corps whose rendezvous must be ascertained through the agency of the public press.

No telegrapher will be enlisted unless he presents a certificate from a manager of the Western Union, Postal, or some other well recognized telegraph organization, that he is a competent operator, of high moral character, correct habits, and of such standing that the manager or superintendent signing the certificate would be willing to employ him as an operator in his own office. A similar certificate will be required for electricians enlisted or commissioned. Each man must pass a strict examination as to his physical qualifications, which will be determined by the medical department of the army.

The Shamokin, Pa., Street Railway Company has been purchased by Congressman M. H. Kulp, of that city, and Judge C. R. Savidge, of Sunbury. The line will be improved and Indian Park made its terminus.

Judgment in Engineering Work.

It was naturally expected that one of the leading attractions for the mechanical engineers at Niagara Falls during the recent convention, observes *The Engineer*, would be the great power plant about which so much has been said and written, and its prominent features were indeed well brought out in the excellent address by Dr. Coleman Sellers, and by the liberal manner in which the entire plant was thrown open for inspection.

It was very interesting, however, to note the surprised interest which was evinced by most of the members at the remarkably well arranged plant below the falls, drawing its power from the old hydraulic canal, and showing evidence of a much greater degree of engineering judgment than was exhibited in the design of the great plant above, with its deep pit, long tunnel and heavy vertical shafts.

As one engineer pithily put it—in the one case we see difficult problems successfully solved, while in the other we are shown how rather to avoid the difficulties and attain equally high results at a fraction of the cost and labor. The comparison was a most instructive one, and many engineers regarded it as well worth the entire time spent at the convention.

New York Electrical Society.

The following members of the New York Electrical Society who have changed their residence are requested to send their new address to the secretary, 120 Liberty street, New York city: B. F. Sherman, R. S. Dobbie, D. D. Book, H. Van Sands, Fred Reed, C. W. Raymond, W. F. Collins, C. E. Hart, J. Egan, G. C. Webb, D. H. Washburn, J. C. Harris, W. Schwein, A. S. Miskin, J. W. McLogan, Meno Fedden, W. A. Giles, Thomas Bennett, T. A. Fowler, S. J. Harris, C. E. Chinnock, R. Crawford, A. C. Greenburg, B. F. Card, A. B. Bennett, N. Hall, J. D. Underhill, J. A. Cabot, W. E. Lamb, E. Denning, R. A. Mitchell, R. Leichman, H. A. Dingle, C. Herman, Leo Bock, Jr., H. F. Salamons, A. G. Holcombe, L. J. O'Reilly, A. V. Waldron, Harry Cette, C. A. Thompson, E. E. Stark, J. T. Palmer, T. F. Grover, J. C. Henry, J. W. Doyle, R. Varley, C. H. Wright, C. C. Gartland, John Deane, Jr., F. E. Dolbier, C. A. G. Groenbeck, James Stewart, C. F. Green, M. W. Grovesteen, G. Arnold, J. S. Cobb, D. H. Starralt, E. Voelckel, G. R. Shepard, W. L. Tamblyn, A. Stamm, C. J. Bickley, H. B. Niles, J. McMahon, E. S. Reid, J. H. Longstreet, M. B. Meddler, C. P. Gott, A. C. Barrett, A. W. Steiger, E. C. Miller, A. McKinnon.

TELEPHONE NEWS AND COMMENT.

The Pike County Telephone Company, Pittsfield, Ill., has certified to an increase of capital stock from $3,500 to $5,000.

The New York & New Jersey Telephone Company recently obtained permission to extend its subway system in Brooklyn, N. Y.

The Bell Telephone Company has obtained a franchise to establish an exchange in Hamburg, N. Y. About 25 instruments will be in use at first.

The Home Telephone Company, of Mobile, Ala., is now operating the trunking system designed by Mr. W. H. Bryant, manager of the company.

The Cumberland Telephone and Telegraph Company is having trouble in Meridian, Miss., as the city authorities are endeavoring to compel it to remove its poles and wires.

The local Bell Telephone Company's exchange at Clarion, Pa., was knocked out by lightning during a storm recently. The switchboard was burnt out and all the connections were destroyed.

Mr. E. A. Knapp, of St. Louis, has made a proposition to the City Council, of Emporia, Kas., to install a new telephone system at rates of $2 a month for business houses and $1 a month to residences.

The directors of the American Bell Telephone Company recently gave President Hudson authority to sell by auction 1,500 shares of stock remaining in the treasury, for which stockholders did not subscribe.

A bill in equity has been filed against the Maryland, Pennsylvania & West Virginia Telephone and Telegraph Company at Pittsburgh, to prevent it from increasing its capital stock from $5,000 to $5,000,000.

A syndicate is to be formed at Groveland, N. Y., to erect a telephone line from the Delaware, Lackawanna & Western station to Scottsburg, thence to Groveland Corners, East Groveland and Long Point, on Conesus Lake.

The Citizens' Telephone Company, Terre Haute, Ind., has been organized, with a capital stock of $75,000. W. P. Ijams is president of the company. The company expects to operate under a franchise obtained 12 years ago by A. J. Crawford and others, and will connect with the new Indianapolis company.

The Western Electric Company, of Chicago, has brought suit in the United States Court asking an injunction to prevent the Detroit Telephone Company from making, using or selling a multiple switchboard, which the complainants claim is an infringement on patents held by them.

A charter has been obtained from the State Department by the Columbia & Montour Telephone Company, composed of wealthy capitalists of Shamokin, Sunbury, Danville and Bloomsburg, Pa., with a capital stock of $500,000. The new company will compete with the Bell company, by leasing lines in Lycoming, Northumberland, Montour and Columbia counties. The main office will be at Danville.

The Camden Telephone Company, which was recently incorporated, with its principal office at Elizabeth City, N. C., has been thoroughly organized and informs the ELECTRICAL REVIEW that it is now ready to begin the construction of its long-distance lines. The officers of the company are E. H. Williams, of Elizabeth City, president, and R. G. Forbes, of Camden, N. C., secretary.

At the annual meeting of the Erie Telegraph and Telephone Company the following were elected directors: C. E. Adams, Chas. J. Glidden, J. W. C. Pickering, Asa C. Russell, Levi Sprague and J. H. Mills, of Lowell, Mass.; W. A. Gove, David S. Greenough and Chas. S. Tuckerman, of Boston, Mass.; Harvey A. Whiting, of Wilton, N. H.; Henry D. W. Burt and H. Fred Stevens, of New York. Mr. Jas. H. Mills, of Lowell, succeeds Abner S. Adams, of Lowell, deceased. The board of directors organized by the election of the following officers: President, Chas. J. Glidden; secretary, Geo. B. Perham; treasurer, Chas. A. Grant; general manager, Jas. P. McKinstry. The annual meeting of the Southwestern Telegraph and Telephone Company was held at the same place, and officers elected as above, with the exception of Messrs. Burt and Stevens, of New York, and with the addition of Mr. Thomas Sherwin, of Boston, and Mr. David B. Parker, of Buffalo, representing the American Bell interests in the company.

ELECTRIC RAILWAY NOTES.

The Lock City, N. Y., Railroad has been sold to Frank Haviland, of New York, representing the Buffalo & Lookport Railway, for $10,000.

The North Shore Interurban Railway Company, of Chicago, has certified to a change of name to the Chicago & Milwaukee Electric Railway Company, and to an increase of capital stock from $340,000 to $1,000,000.

Chancellor McGill has appointed James E. Degnan, of Red Bank, receiver of the Atlantic Highlands, Red Bank & Long Branch, N. J., Electric Railway, a trolley road operating between Belford, Red Bank and Long Branch.

The Bowling Green, Ky., Railway Company, with $40,000 capital stock, has been incorporated. The incorporators are C. H. Shield, J. C. Mahon and T. H. Whayne. The company operates a street railway system in the Park city.

The right of way for the proposed Tiffin, Fremont and Lakeside, Ohio, electric road has been secured and work will begin shortly. The route will include Fort Seneca, Old Fort, Fremont and other intermediate points to the lake.

The Indiana Traction Company, under which name the Clodfelter electric railroad interests were reorganized some months ago, has been absorbed by the Union Traction Company and the Marion City, Ind., Railroad Company.

A 50-year franchise has been granted to the Geneva Lake, Sycamore, Ill., & Southern Railroad Company, to build its road through the principal thoroughfare of this city. The road will carry passengers, mail and freight, and extends from Geneva Lake, Wis., to Morris, Ill.

The stockholders of the Wilmington, Del., & Brandywine Springs Electric Railway Company have elected the following officers: President, Robert C. Justis; secretary and treasurer, Dr. L. H. Ball; general manager, Richard W. Crooks; directors, Joseph H. Coates, George W. Atmore, and the officers.

At the annual meeting of the corporation of the Keene, N. H., Electric Railway Company the following officers were re-elected: F. H. Whitcomb, clerk; E. F. Lane, C. H. Hersey, C. J. Woodward, Edward Gustine, F. C. Faulkner, Daniel R. Cole and Hiram Blake, directors.

The Fall River, Mass., Street Railway Company, which has been operated one year, and which includes 27 miles of track, a dozen of the latest cars and other fixings, has been deeded to the Globe Street Railway Company. The lines will be connected within a month and transfers issued.

The Plainfield, N. J., Street Railway Company has elected the following officers for the ensuing year: President, Thomas Nevins; vice-president, Dr. J. T. Fritts; secretary and treasurer, Adrian Riker; directors, Chandler W. Riker, Cortland Riker, John B. Brown, Dr. J. T. Fritts, Adrian Riker, and Thomas A. Nevins; superintendent, John A. Adelmann.

The annual report of the Twin City, Minn., Rapid Transit Company shows that as compared with 1896, gross earnings decreased about $50,000, or 2.43 per cent, and operating expenses increased $6,922, the decrease in net being $57,019. From the $1,007,040 net earned in 1897, deductions of $771,906, representing interest and preferred dividend charges and taxes, are made, leaving a surplus for the year of $235,133, as compared with a like surplus in 1896 of $299,998.

The plant of the Bloomington, Ill., City Railway Company has been sold by order of court for $202,500 to a syndicate representing the second mortgage bondholders, and the Bloomington & Normal road has been incorporated with a capital stock of $250,000. Its offices will be at Bloomington. Holders of the $100,000 six per cent bonds of the Bloomington & Normal line foreclosed some time ago, and the property has been in a process of reorganization since. About 70 per cent of the bonds were held by Chicago parties, and a block of them formed one of the assets of the defunct National Bank of Illinois.

The Providence & Taunton, Mass., Street Railway Company has been incorporated. The capital stock is $160,000. F. E. Perkins, treasurer; Reuben Bowen, N. E. Walker, G. E. Francis, Asa Waterman, and Peter Corr, directors. Articles are also filed by the Boston, Milton & Brockton Street Railway. It will run from the boundary line between Boston and Milton, through Milton, Quincy, and Randolph to "West Corners," in the last town, eight miles. The capital is $80,000. Bradford Hamilton is clerk and treasurer, and the remaining directors are G. J. Morse, G. A. Hilton, F. W. Archer, A. H. Crossman, F. C. Hinds, J. H. Packard, J. B. L. Bartlett.

ADVANCE INFORMATION

New Telephone and Telegraph Companies.

SUSQUEHANNA, N. Y.—The Susquehanna Valley Telephone Company has been incorporated, to operate in Chenango, Broome and adjoining counties; capital, $1,000. Directors: John B. Pierce, of Afton; Charles S. Butler and George W. Hobbs, Nineveh, and others.

SARATOGA SPRINGS, N. Y.—Cassius B. Thomas has petitioned the Board of Trustees for a franchise to erect and operate a telephone plant in this place, offering to give good service at a rate not to exceed $2.50 a month.

PIERCE CITY, MO.—The South Missouri Telephone Company has been incorporated; capital stock, $20,000. Incorporators: A. J. Armstrong, G. R. Armstrong, Albert Newman and others.

EVERTON, IND.—The people of Jackson township have contracted with L. A. Frazee for a free telephone line to this place. The work will be commenced at once, and the line will be completed in a few weeks.

LAVINA, MONT.—The Billings & Fergus County Telephone Company has been incorporated with a capital stock of $5,000. Incorporators: Harry F. and Frank D. Scott, Ludwig Lehfeldt and others, all of this place.

LITTLE ROCK, ARK. — Mountain Home & West Plains Telephone Company has been incorporated by C. W. Brown, president; N. H. Dyer, B. E. Massey, B. C. Paul, W. E. Eatman and R. C. Love; capital stock, $5,000.

RALEIGH, N. C.—The Interstate Telephone Company, of Durham, N. C., has been granted franchise to establish telephone system in Raleigh.

SWANWICK, ILL.—United Telephone Company has been incorporated by John I. Higgs, P. Fearnsen and Hall Rebb; telephones; capital stock, $700.

CHATTANOOGA, TENN. — H. A. Helvin, of Columbia, Tenn., and others have been granted franchise to operate a telephone exchange in this city, and to erect poles and string wires for that purpose.

COLUMBUS, GA.—E. W. Coleman, of Chattanooga, Tenn., has applied for franchise to establish and operate a telephone system in Columbus.

MOUND CITY, S. DAK.—The Eureka & Mound City Telephone Company has been incorporated by F. W. Boettcher, Walter C. Poehler, Louis H. Clyborne, Chauncey E. Eckert and Alvin H. Poehler; capital stock, $2,000.

NASHVILLE, TENN.—The Meigs County Telephone Company has filed an amendment to its charter, authorizing an increase in its capital stock from $5,000 to $7,500.

CHATTANOOGA, TENN.—J. A. Helvin, of Charlotte, N. C., has been granted telephone franchise which he recently applied for.

TUSCUMBIA, ALA.—A telephone line is being rapidly built from this city to Milk Springs, a well known local health resort five miles south of Tuscumbia, by the enterprising citizens owning Summer homes there. The poles are being placed in position, and it is thought the line will be completed and ready for service within a month. It will connect with Sheffield, Florence and Leighton, and prove a source of much benefit to the Summer sojourners there.

WALLACE, WASH. — The Rocky Mountain Bell Telephone Company is extending its Cœur d'Alene system. At present its lines run from Spokane via Cœur d'Alene City and through the Fourth of July Canyon to this city, with branches from here to Burke, Murray and Mullan.

DECATUR, ALA.—A franchise has been granted to the American Telephone and Telegraph Company. Similar franchises are being asked for all over North Alabama, and thus connection will soon be secured through the company's system from Omaha to Augusta, Me.

SIOUX FALLS, S. DAK.—The Eureka and Mound City Telephone Company, with a capital of $2,000, has been incorporated. Incorporators are T. W. Boettcher, Walter C. Poehler, Eureka; Louis H. Clyborne, Chauncey E. Eckert, Mound City; Alvin H. Poehler, Minneapolis.

Electric Light and Power.

FARMER, N. Y.—It is reported that an electric light plant is to be established here.

PORTLAND, ME. — The Deering Electric Light Company has been incorporated by William L. Waters and others; capital stock, $25,000.

GARLAND COUNTY, ARK. — The People's Light and Heat Company has been incorporated by J. G. Londsdale and others; capital stock, $25,000.

COLUMBIA, S. C.—The Columbia Traction, Light and Power Company has been incorporated by Frank F. William, Willet Hazard, F. H. Weston, and I. L. Withers; to buy and operate the present electric light and power plant; capital stock, $500,000.

BRISTOL, TENN.—Dr. F. J. Hicks, president; John C. Anderson, secretary-treasurer; John N. Huntsman and others, directors of electrical company which was recently formed to build electric light and power plant.

UNION SPRINGS, ALA.—The Mayor may be addressed concerning erection of proposed electric light plant.

BIRMINGHAM, ALA.—J. J. Altman is interested in the erection of an electric light plant.

DALTON, GA.—An electric light plant will probably be erected.

BROOKHAVEN, MISS.—The Mayor may be addressed concerning additions to electric light plant.

NATCHEZ, MISS. — The Natchez Light, Power and Transit Company, recently incorporated, has obtained franchise, and will erect a plant for electrically lighting and for furnishing power.

PETOSKEY, MICH. — An electric lighting plant will probably be established.

New Electric Railways.

SOUTH ALLENTOWN, PA.—A trolley line is to be built from this place to Emaus. It will be in operation before August 1.

LOGANSPORT, IND. — An electric railway is talked of between this place and Burlington.

ASBURY PARK, N. J.—The Asbury Park and Sea Girt Railway Company has been incorporated. The incorporators are: Messrs. John E. Connors, of Arlington, N. J.; Daniel H. Shea and H. B. Perrine, of New York city. The company is capitalized at $100,000.

OSHKOSH, WIS.—The Oshkosh-Omro-Berlin Electric Railway Construction Company has been organized, with a capital stock of $25,000. It consists of J. H. Jenkins, S. W. Hollister, John Hinebaugh, Nathan Paine, Jay Hume, W. J. Wagstaff, R. C. Russell, A. B. Ideson and Charles Barber. The company will build an electric road from this city to Berlin.

FOSTORIA, OHIO—Work has been begun on the track of the Tiffin, Fostoria & Eastern Electric Railway in this city.

REYNOLDSVILLE, PA. — Eastern capitalists are considering the feasibility of building a 40-mile electric railroad from Clarion to Du Bois, Pa., taking in Strattonville, Corsica, Brookville, Reynoldsville, Rathmel and other smaller towns.

New Incorporations.

PORTLAND ME.—The Gordon Battery Company has been organized for the purpose of generating and dealing in electricity, with $350,000 capital stock, of which $250 is paid in. President, Arthur S. Pinkham, of New York.

CHICAGO, ILL. — The Chicago Rhiestal Company has been incorporated; capital stock, $25,000. Incorporators, Alexander MacBair, John W. Mills, Walter Wissing.

LOUISVILLE, KY.—The Wheeler Compensating Motor Company, with $25,000 capital stock, has been incorporated; incorporators, Robert Hewitt Wheeler, S. L. Mason, J. W. Seaton. The corporation is to have the right to purchase and acquire titles to motors, and is to especially engage in the manufacture and sale of "rotary compensating motors" and of engines and locomotives.

ST. LOUIS, MO.—The King Electric Company has been incorporated, with a capital stock of $10,000. John C. King, Ida A. King and John A. King, incorporators.

BROWNING, MO. — The Riddle Power Transmitting Company has been incorporated, with a capital stock of $5,000; incorporators, E. C. Riddle, C. A. Lewis, W. H. Mansur and others.

Increase of Capital.

ASHLAND, KY. — The Lawrence Telephone Company has increased its capital stock from $12,000 to $24,000.

NEW YORK, N. Y.—The Southwestern Telegraph and Telephone Company, which operates in Arkansas, Missouri and adjacent states, has increased its capital stock from $4,000,000 to $5,000,000.

NASHVILLE, TENN. — The Meigs County Telephone Company has increased its capital stock from $5,000 to $7,500.

ROCHELLE, ILL.—The Ogle County Telephone Company has increased its capital from $5,000 to $.0,000.

Street Railway Franchise Wanted in Chicago.

One of the first companies to take advantage of the much-discussed Allen law in Illinois is the Wisconsin Inland Lakes & Chicago Railway Company, which has asked the Chicago council to pass its ordinance. The measure asks for a 50-year street railway franchise. An effort will be made to have it passed before vacation time. It allows the city $6,000 a year for the first 10 years, after which the amount is to be increased. Alfred E. Case is the president of the company. The route of the line will begin at North State and Kinzie streets, and follow the course of the north branch of the river to Center street.

Railway Telegraph Superintendents.

At the annual meeting of the Association of Railway Telegraph Superintendents, held at Omaha, Neb., on June 15, the following officers were elected: President, W. W. Ryder, of the Chicago, Burlington & Quincy, Chicago; vice-president, L. B. Foley, of the Delaware, Lackawanna & Western, New York; secretary and treasurer, P. W. Drew, of the Wisconsin Central, Milwaukee.

The Evansville, Ind., Telephone Company has been incorporated; capital stock, $150,000. The company proposes to operate in 18 southern Indiana counties.

Kindred.... ...Interests

The Phosphor-Bronze Smelting Company, 2200 Washington avenue, Philadelphia, Pa., has issued a new and revised price-list of its phosphor-bronze products.

The Western Electric Company advises central stations using the alternating-current apparatus that it will quote prices on the Lakon transformers and Lakon cut-outs for transformers.

The Westinghouse Electric and Manufacturing Company, Pittsburgh, is sending out a beautiful little leaflet, with the cover printed in colors, relating to the Wurts lightning arresters. The front cover design is particularly attractive.

The Central Electric Company, of Chicago, are carrying in stock an improved type of turn buckles, both galvanized and plain, which can be furnished hook and eye, double hook or double eye. These goods are standardized and constructed with a view of great strength being secured.

The Harrison Safety Boiler Works, Philadelphia, Pa., have issued a handsome booklet describing the Cochrane separators for live steam, exhaust steam, compressed air, etc. These separators are in use in a considerable number of street railway and electric light plants. The booklet gives a thorough description of the device, and may be had free on application.

The American Wheelock Engine Company, of Worcester, Mass., report a large number of recent sales of the Greene-Wheelock engines, which they build. A recent order was for six 1,500-horse-power engines for the Chicago City Railway Company, with rope drives. Another was for three 350-horse-power direct-connected engines for J. G. White & Company, of New York city.

The Stromberg-Carlsen Telephone Manufacturing Company, Chicago, has just completed the installation of the first 100 section switchboard for the Fulton County Telephone Company at its Peoria, Ill., exchange. The new central energy system is used, making the third installation of that kind completed by the company during this month. Evidently the simplicity and superiority of the new system appeals strongly to telephone investors.

The Davis & Ludwig Foundry Company, Chicago, has been making a specialty of electrical castings for some years, and from the tests made on a number of sample bars from time to time, it would seem that the company had succeeded in producing dynamo, motor and similar castings, which in points of high permeability, low reluctance and uniformity in general are only excelled by wrought-iron. The company invites correspondence with all makers of electrical apparatus interested in the matter.

The American Tool Works Company, of Cincinnati, Ohio, report a decided increase in their foreign orders. They have received in the past week orders through almost all of their European offices. Among them, one through their office at Stockholm, Sweden, for 10 engine lathes ranging in swing from 14 inches to 18 inches, together with a number of drill presses of various sizes. Their office at St. Petersburg, Russia, secured an order for 25 engine lathes ranging from 14 inches to 30 inches swing.

The Valley Telephone Company, operating in Saginaw, West Saginaw, Bay City, West Bay City and Flint, Mich., expects to have all of its exchanges in operation before July 1 next. It is said that the engineering work upon the company's several exchanges is probably the best that has entered in the construction of independent exchanges. The conduit and cable work, the pole line and inside wiring, and the arrangement of the exchanges themselves are models of workmanship and perfect arrangement. When completed, these exchanges will no doubt be visited by many prospective purchasers of telephone equipments. A full line of Sterling apparatus is used, including switchboards, distributing boards, cable and pole top terminals and protective devices.

The Western Telephone Construction Company, Chicago, feels just a bit proud over the fact of having just secured a contract for a new 2,000-line multiple switchboard to be installed in the main central exchange of the Newark Telephone Company, Newark, N. J., making this exchange, it is said, the largest and most comprehensive strictly first-class independent telephone exchange in full operation in the United States, the main exchange with the Belmont street, Belleville street, Roseville street and Ferry street branches having total capacity for connection of upwards of 3,100 individual lines. The fact of "Western" apparatus being selected by the above company, after a careful investigation of the various switchboards procurable in this country, speaks volumes for the high appreciation of first-class apparatus on the part of the independent exchanges.

DYNAMO FIELD RHEOSTATS
WARD LEONARD ELECTRIC CO.,
Bronxville, N. Y., U. S. A.

THE
"Demary" Switch
has a locking device, making it impossible to open until full tension of spring is obtained; this prevents dragging and insures an absolutely instantaneous break. All parts interchangeable. Every switch guaranteed free from defects of work or material. Ask for photograph and prices.
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Site suitable for Power-House or similar use to lease for long term of years. Ground 84x84, within one block of BROADWAY, NEW YORK. Fronting on three streets, more ground adjoining could be acquired. Is high and dry, permitting basement thirty feet deep. Basement could also run under sidewalks of all three fronts. Apply to
HAWLEY & HOOPS,
271 Mulberry Street, New York.

J. G. WHITE & COMPANY,
INCORPORATED.
ENGINEERS, CONTRACTORS,
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EQUITABLE BLDG., BALTIMORE.

IRON ROOF FOR SALE.
Dimensions of building—87 ft. in width, 225 ft. in length, one story in height; side walls and gables of brick; building designed for a machine shop, but, owing to the failure of the purchaser, the iron roof trusses are now offered for sale at a bargain. The roof is admirably adapted for a machine shop, car barn, paper mill, or for any other general manufacturing purposes.
Apply to
THE BERLIN IRON BRIDGE COMPANY,
EAST BERLIN, CONN.

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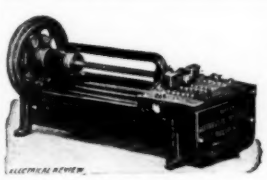
GAS LIGHTING SPARK COILS,
THE VARLEY DUPLEX MAGNET CO., 138 Seventh Street, Jersey City, N. J.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Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED JUNE 21, 1898.

605,842 Electrically-heated charge for cartridges or shells; L. W. Bates, Chicago, Ill.—A cartridge or prepared charge for use in guns, comprising a suitable projectile, a shell or casing, an agent contained within said shell or casing, adapted to be converted by heat into a vapor or gas, means for retaining and releasing the gas or vapor as required, and an electric heater applied to said shell or casing.

605,850 Electric motor; F. E. Briner, St. Louis, Mo.—An armature for induction motors, comprising an elongated core and induced-current conducting bars whose ends are bent one upon the other, said ends interlocking with each other.

605,862 Electric meter; T. Duncan, Fort Wayne, Ind.—An electric meter, provided with a cylindrical armature, a shunt field within the armature, and a series field without the armature, comprising separate horseshoe-shaped cores partially embracing the armature, and series coils wound upon said cores.

605,915 Electric clock-controlled switch mechanism; R. W. Rollins, Hartford, Ct.

605,941 Electric block system for railways; L. C. Werner, Broad Brook, Ct.—An automatic electric block-signal system, comprising a track having a sectional conductor forming insulated blocks, a vehicle movable along said track, a primary electrical register controlled by a block circuit, and a separately operative secondary electrical register controlled conjointly by the primary register and a block circuit.

605,949 Electric meter; T. Duncan, Fort Wayne, Ind.—An electric meter, provided with a cylindric armature, a series field without the armature, and a shunt field within the armature, comprising a cross-shaped core and shunt coils upon said core.

605,953 Controlling mechanism for electric motors; Geo. Gibbs, Milwaukee, Wis.

605,956 Controller for type-casting and setting machines; Geo. A. Goodson, Minneapolis, Minn.

605,970 Electro-magnetic switch railway; A. Norman, Toronto, Canada.

606,004 Thermal circuit-closer; L. Emdin, Reading, Pa.

606,009 Electric controller; M. W. Hanks, Madison, Wis.—Consists of a contact cylinder mounted on a rotatable shaft, a second shaft having actuating means and a disk provided with springs, said springs engaging with a pin extending from an arm on the cylinder shaft.

606,012 Electric current controller; J. J. Hogan, New Haven, Ct.

606,015 System of electrical distribution and regulation; B. G. Lamme, Pittsburgh, Pa.—Comprises a direct-current generator, a rotary transformer receiving current therefrom and supplying alternating current to translating devices, a generator for exciting the field magnet of said rotary transformer, and means dependent upon changes in the amount of inductive load on the alternating-current circuit or circuits for automatically varying the speed of the exciting generator.

606,033 Means for compensating for temperature resistance changes; Charles F. Scott, Pittsburgh, Pa.—An indicating instrument for alternating currents, comprising a rotatable closed-circuit armature of two actuating circuits in inductive relation to said armature and containing non-inductive resistances, one of which has a greater value and a higher temperature resistance coefficient than the other.

606,043 Signal alarm; F. Bessert Detroit, Mich.—Consists of a housing having an opening in one side, a torch hinged within the housing free to fall in the direction of said opening, a combustible connection securing the torch against falling and adapted to be destroyed by the burning of the torch, and means for lighting the torch.

606,056 Alternating-current electric motor; R. H. Hassler, Pittsburgh, Pa.—The method of controlling the speed of a rotating shaft or axle, which consists in subjecting the same to the resultant torque of two rotating magnetic fields, having a different number of poles for one rate of speed, and changing the direction of rotation of one of said fields for a different rate of speed.

606,076 Electric alarm system; A. Ovenden, Akron, Ohio—An inclined way, composed of a plurality of oppositely extending superimposed separate members, one side of which is composed of conducting material throughout, while the other is composed of non conducting material, having a portion of the engaging face formed of conducting material and a roller circuit-closer.

606,108 Electric arc lamp; F. Wright, Newburgh, N. Y.—Comprises a casing, carbon magazines mounted on said casing, carbon-holder tubes extended from the magazines and converging, carbon-plocking plates on the tubes, and means for automatically operating said plates.

606,127 Electrode for arc lights; C. S. Dolley, Philadelphia, Pa.—An electric arc electrode, manufactured of calcium carbide.

606,162 Telephone exchange system; W. W. Dean, St. Louis, Mo.

606,167 Electric brake; E. W. G. Hoffmann, Charlottenburg, Germany.

606,171 Shunt for electric circuits; O. B. Shallenberger, Rochester, Pa.—An electric shunt, comprising two groups of conductors which have different temperature coefficients.

Brush Apparatus in Constant Demand.

The Buffalo General Electric Company has just ordered 12 125-light Brush arc dynamos from the Brush Electric Company, of Schenectady, N. Y., and the Boston Electric Light Company has purchased twenty 160-light Brush machines for its new station. This will undoubtedly be one of the finest arc lighting plants in the world when completed. At the Norfolk, Va., central station all the old apparatus, consisting of some fifteen 50-light arc machines, has been replaced by modern Brush dynamos. The Brush Electric Company states that it has more orders for its apparatus than ever before, yet its manufacturing facilities are such that any order can be promptly filled.

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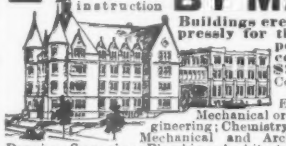
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